United States Department of Agriculture

Forest Service

North Central Forest Experiment Station

General Techincal Report **NC-96**

Empirical Yield Tables for Michigan

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White pine
Red pine
Jack pine
White spruce
Black spruce
Balsam fir
Hemlock
Tamarack
White cedar
White oak
Red oak
Hickory
Yellow birch
Hard maple
Soft maple
Beech
Ash
Balsam poplar
Cottonwood
Bigtooth aspen
Quaking aspen
Basswood
Yellow poplar
Black walnut
Black cherry
Butternut
Elm
Paper birch

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1992 Folwell Avenue
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Manuscript approved for publication December 27, 1983
September 1984

CONTENTS

	Page
Literature Cited	3
Appendix	3
Definition of Terms	3
Tree Species Groups in Michigan	4
Tables	6

EMPIRICAL YIELD TABLES FOR MICHIGAN

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Empirical yield tables are useful to managers of timber, wildlife, and other forest resources who are interested in estimating current commercial forest species composition and volume or in making rough, short-term projections of future conditions. This paper provides empirical yield tables for Michigan and demonstrates some uses for them. If you are interested in comparing conditions in the Lake States, similar sets of tables are presented in "Empirical Yield Tables for Wisconsin" (Essex and Hahn 1976) and "Empirical Yield Tables for Minnesota" (Hahn and Raile 1982). In addition, unpublished empirical yield tables for Missouri and Iowa are available at cost from the Forest Inventory and Analysis Research Work Unit at the North Central Forest Experiment Station.

Yield tables for Michigan were compiled from data gathered on 7,700 commercial forest land plots established during the 1980 inventory of Michigan's four Forest Survey Units (fig. 1). Tables by forest type and site index class are presented for the entire State and for each Survey Unit. Only tables having sufficient data, usually 3 or 4 plots, in each of three adjacent age classes are presented; we feel that information based on smaller samples would not be useful. In addition to the net cubic foot volume tables, we present tables showing total green weight of above-ground biomass for all live trees. State total tables for all sites are printed in this report. State total tables by site index class and Survey Unit tables are included as microfiche inside the back cover.

The tables give the estimated merchantable cubic foot volume yield per acre from growing-stock trees[1] and the average basal area per acre of all live trees 1.0 inches diameter breast height (d.b.h.) and larger by stand age class for the 14 forest types defined in the Appendix. These tables provide a detailed picture of stand composition as measured by growing-stock volume.

[1] *See Appendix for definitions of growing-stock and all live trees.*

The tables were constructed by classifying the commercial forest land plots measured in the 1980 inventory by forest type, stand-age class, and site-index class. Then the per-acre merchantable cubic foot volume or the total above-ground biomass was tabulated by species group. The merchantable volume standards used are minimum 5-inch (d.b.h.) to a 4-inch top diameter outside bark (top d.o.b.) with a 1 foot stump. Individual tree volumes were computed using a formula developed from "Composite volume tables for timber and their application in the Lake States" (Gevorkiantz and Olsen 1955) as described by Raile *et al.* (1982). A full explanation of the survey procedures and definitions can be obtained from "Michigan Forest Statistics, 1980" (Raile and Smith 1983).

The tables can be used in several ways. For example, they can be used to estimate future timber yield in the same manner as normal yield tables—it is assumed that the volume shown in one age class will increase in 10 years to the volume shown in the next older age class. For example, red pine stands aged 61-70 years currently average 1,425 cubic feet per acre (table 2). If you have a stand of red pine 51-60 years old, you could expect that in 10 years the stand would yield approximately 1,425 cubic feet per acre.

Rotation age (Years)	Area harvested year[2] (Thousand acres)		Merchantable volume/acre[3] (Cubic feet)		Annual harvest volume (Million cubic feet)
35	97.3	X	978	=	95.1
45	75.7	X	1,136	=	86.0
55	61.9	x	1,252	=	77.5

[2] *Total type acreage (3,406,600 acres)/rotation age (35 years).*

[3] *From table 13.*

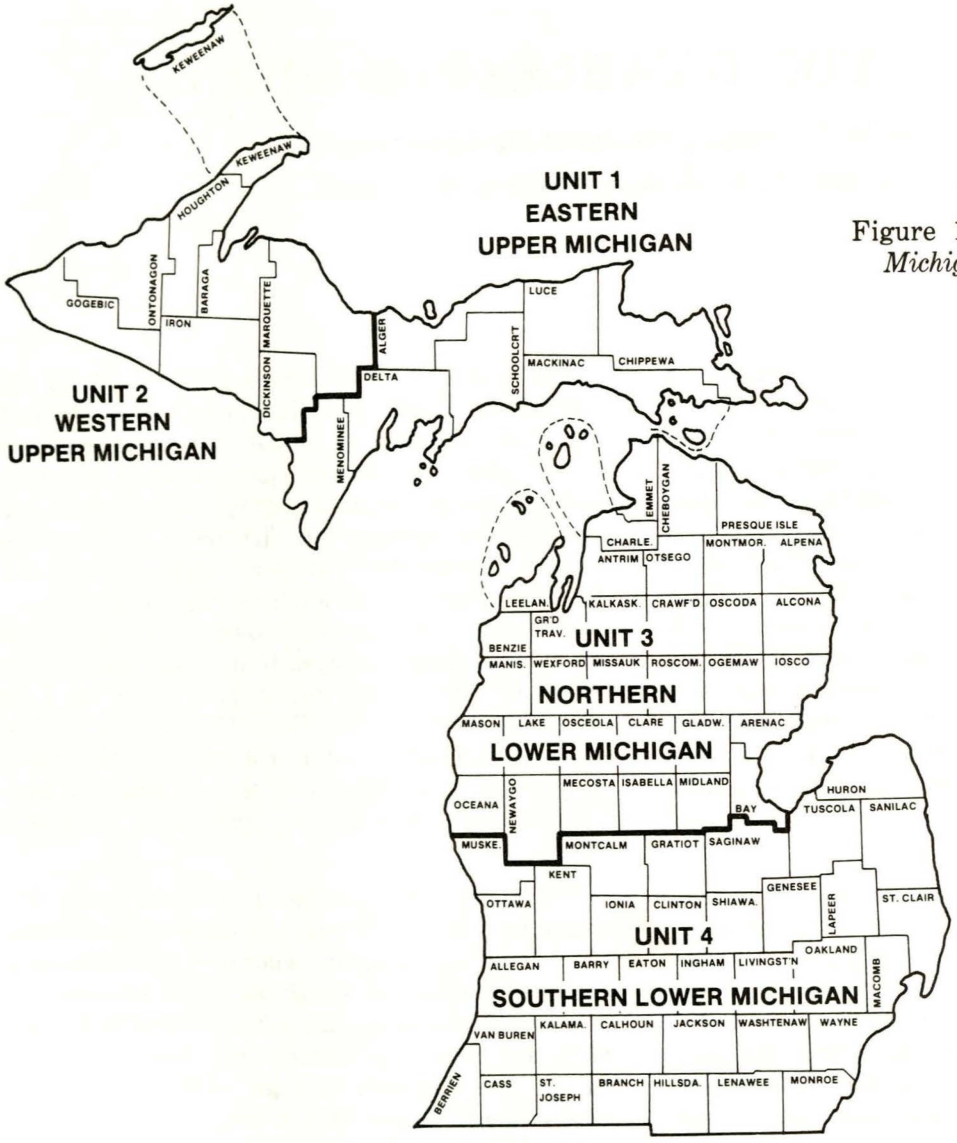

Figure 1. *Forest Survey Units in Michigan.*

As a second example, these tables can be used in conjunction with other forest inventory publications to compare volume estimates for progressive rotation ages. For instance, the aspen type occupied 3,406,600 acres in Michigan in 1980 (Spencer 1983). Assuming that you would harvest an equal number of acres each year, estimates of the annual harvest volume can be derived using the yields shown in table 13.

In addition, these harvest volumes can be broken down by species group. (See Appendix for a detailed breakdown of the species groups). By using table 13, the annual harvest volume is further broken down into softwoods and hardwoods.

According to this analysis, both the greatest total yield and the greatest softwood yield would be attained by using a 35-year rotation for the aspen type, although more acres would have to be harvested each year to obtain that volume. Currently, almost two-thirds of the plots in the aspen type are in stands older than 35 years. Therefore, considerable volume from older plots would have to be harvested to reach a 35-year rotation.

Rotation age (Years)	Harvest volume		
	Total	Softwoods (Million cubic feet)	Hardwoods
35	95.1	12.9[4]	82.2
45	86.0	12.8	73.2
55	77.5	12.2	65.3

[4]*Cubic feet/acre of softwoods or hardwoods in the forest type of interest (133 cubic feet) x number of acres in the forest type (97,300 acres.)*

Finally, the basal area volume in these tables allow a comparison between stand density and stand age that can be used in conjunction with other inventory data to determine whether existing stands are fully stocked. For example, in 1980 there were 481.3 thousand acres of aspen 51-60 years old in Michigan (Spencer 1983). Yields in these stands (all species) averaged 98 square feet per acre (table 13). Thus, the ratio of volume to basal area was 12.8 to 1. Schlaegel (1971) predicted that such a ratio for fully stocked stands of aspen in Minnesota would be 26 to 1. If we view Schlaegel's prediction as an index of stand potential, we can generalize that similar aspen sites that are fully stocked could be expected to yield roughly twice as much as these stands are producing now. The comparison can only be approximate because Schlaegel used different standards of merchantability in computing his volume.

The volumes shown in these tables were obtained from plots located in stands with various histories, from undisturbed stands to those that had been repeatedly cut. Thus, standard errors of mean volume are given in the tables to indicate their variation. Sampling error in percent can be determined by dividing the standard error by the mean volume of all species. For example, the sampling error for jack pine in the 41-50 year age class for all sites combined (table 1) is 6.6 percent (53/809) x 100).

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APPENDIX

DEFINITION OF TERMS

Forest type.—A classification of forest land based upon the species forming a plurality of live tree stocking. Major forest types in Michigan are:

Jack pine.—Forests in which jack pine comprise a plurality of the stocking. (Common associates include eastern white pine, red pine, aspen, birch, and maple).

Red pine.—Forests in which red pine comprise a plurality of the stocking. (Common associates include eastern white pine, jack pine, aspen, birch, and maple).

White pine.—Forests in which eastern white pine comprise a plurality of the stocking. (Common associates include red pine, jack pine, aspen, birch, and maple).

Balsam Fir.—Forests in which balsam fir and white spruce comprise a plurality of stocking with balsam fir the most common. (Common associates include aspen, maple, birch, northern white-cedar, and tamarack).

White spruce.—Forests in which white spruce and balsam fir comprise a plurality of the stocking with white spruce the most common. (Common associates include aspen, maple, birch, northern white-cedar, and tamarack).

Black spruce.—Forests in which swamp conifers comprise a plurality of the stocking with black spruce the most common. (Common associates include tamarack and northern white-cedar).

Northern white-cedar.—Forests in which swamp conifers comprise a plurality of the stocking with

northern white-cedar the most common. (Common associates include tamarack and black spruce).

Tamarack.—Forests in which swamp conifers comprise a plurality of the stocking with tamarack the most common. (Common associates include black spruce and northern white-cedar).

Oak-hickory.—Forests in which northern red oak, white oak, bur oak, or hickories, singly or in combination, comprise a plurality of the stocking. (Common associates include jack pine, beech, yellow-poplar, elm, and maple).

Elm-ash-soft maple.—Forests in which lowland elm, ash, cottonwood, and red maple, singly or in combination, comprimise a plurality of the stocking. (Common associates include birches, spruce, and balsam fir).

Maple-birch.—Forests in which sugar maple, basswood, yellow birch, upland American elm, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include white pine, elm, and hemlock).

Aspen.—Forests in whch quaking aspen or bigtooth aspen, singly or in combination, comprise a plurality of the stocking. (Common associates include balsam poplar, balsam fir, and paper birch).

Paper birch.—Forests in which paper birch comprise a plurality of the stocking. (Common associates include maple, aspen, and balsam fir).

Exotic.—Forests in which species not native to Michigan comprise a plurality of the stocking. (Most common exotic species is Scotch pine).

Growing-stock trees.—Live trees of commercial species qualifying as desirable and acceptable trees (excludes rough and rotten trees).

Live trees.—Growing-stock, rough, and rotten trees 1 inch d.b.h. and larger.

TREE SPECIES GROUPS IN MICHIGAN[5]

SOFTWOODS
- Eastern white pine ..... *Pinus strobus*
- Red pine ..... *Pinus resinosa*
- Jack pine ..... *Pinus banksiana*
- White spruce ..... *Picea glauca*
- Black spruce ..... *Picea mariana*
- Balsam fir ..... *Abies balsamea*
- Eastern hemlock ..... *Tsuga canadensis*
- Tamarack ..... *Larix laricina*
- Northern white-cedar ..... *Thuja occidentalis*

Other softwoods
- Eastern redcedar ..... *Juniperus virginiana*
- Norway spruce ..... *Picea abies*
- Engelmann spruce ..... *Picea engelmannii*
- Austrian pine ..... *Pinus nigra*
- Scotch pine ..... *Pinus sylvestris*

HARDWOODS

White oaks
- White oak ..... *Quercus alba*
- Swamp white oak ..... *Quercus bicolor*
- Bur oak ..... *Quercus macrocarpa*
- Chinkapin oak ..... *Quercus muehlenbergii*
- Chestnut oak ..... *Quercus prinus*

Select red oak
- Northern red oak ..... *Quercus rubra*

Other red oaks
- Scarlet oak ..... *Quercus coccinea*
- Northern pin oak ..... *Quercus ellipsoidalis*
- Pin oak ..... *Quercus palustris*
- Black oak ..... *Quercus velutina*

Hickories
- Bitternut hickory ..... *Carya cordiformis*
- Pignut hickory ..... *Carya glabra*
- Shellbark hickory ..... *Carya laciniosa*
- Shagbark hickory ..... *Carya ovata*
- Mockernut hickory ..... *Carya tomentosa*

Yellow birch ..... *Betula alleghaniensis*

Hard maples
- Sugar maple ..... *Acer saccharum*
- Black maple ..... *Acer nigrum*

Soft maples
- Red maple ..... *Acer rubrum*
- Silver maple ..... *Acer saccharinum*

American beech ..... *Fagus grandifolia*

Ashes
- White ash ..... *Fraxinus americana*
- Black ash ..... *Fraxinus nigra*
- Green ash ..... *Fraxinus pennsylvanica*

Balsam poplar ..... *Populus balsamifera*

Eastern cottonwood ..... *Populus deltoides*

Aspens
- Bigtooth aspen ..... *Populus grandidentata*
- Quaking aspen ..... *Populus tremuloides*

Basswood ..... *Tilia americana*

Yellow-poplar ..... *Liriodendron tulipifera*

Black walnut ..... *Juglans nigra*

Black cherry ..... *Prunus serotina*

Butternut ..... *Juglans cinerea*

Elms
- American elm ..... *Ulmus americana*
- Slippery elm ..... *Ulmus rubra*
- Rock elm ..... *Ulmus thomasii*

Paper birch ..... *Betula papyrifera*

Other hardwoods
- Boxelder ..... *Acer negundo*
- Sweet birch ..... *Betula lenta*

[5] *The common and scientific names are based on: Little, Elbert L. Checklist of United States Trees (Native and Naturalized). Agric. Handb. No. 541. Washington, DC: U.S. Department of Agriculture, Forest Service; 1979. 375 p.*

River birch ..... *Betula nigra*
Black willow..... *Salix nigra*
Ohio buckeye ..... *Aesculus glabra*
Flowering dogwood ..... *Cornus florida*
Honeylocust..... *Gleditsia triacanthos*
Osage-orange ..... *Maclura pomifera*
Black tupelo ..... *Nyssa sylvatica var. sylvatica*
Sycamore ..... *Platanus occidentalis*
Black locust..... *Robinia pseudoacacia*
Sassafras..... *Sassafras albidum*
Red mulberry ..... *Morus rubra*
American chestnut..... *Castanea dentata*

Table 1.--Cubic foot volume per acre in growing-stock trees by species group and stand-age class, Michigan, 1980[1/]

Jack pine forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	12	8	10	0	10	13	10	0	21	92	212	0	0
Red pine	48	21	27	31	65	65	41	27	76	99	124	0	0
Jack pine	440	89	139	219	450	633	542	712	644	500	259	480	207
White spruce	0	0	0	0	0	1	2	0	0	0	0	0	0
Black spruce	6	3	0	0	14	5	14	0	6	0	34	0	0
Balsam fir	1	0	0	0	1	2	0	0	3	0	0	0	0
Hemlock	0	0	0	0	0	0	0	0	0	0	0	0	0
Tamarack	0	0	0	0	1	0	0	0	0	0	0	0	0
Northern white-cedar	0	0	0	0	2	0	0	0	0	0	0	0	0
Other softwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	509	121	176	250	544	719	608	739	750	690	630	480	207
Hardwoods:													
Select white oaks	2	2	0	2	1	1	8	6	0	0	0	0	0
Select red oaks	28	25	16	2	16	51	28	16	40	0	199	240	0
Other red oaks	14	2	0	8	20	14	21	30	26	0	0	0	0
Hickory	0	0	0	0	0	1	0	0	0	0	0	0	0
Yellow birch	0	0	0	0	0	0	0	0	0	0	0	0	0
Hard maple	0	0	0	0	0	1	0	0	0	0	0	0	0
Soft maple	4	5	2	0	5	1	2	0	29	0	0	0	0
Beech	0	0	0	0	0	0	0	0	0	0	0	0	0
Ash	0	0	0	0	0	0	0	0	0	0	0	0	0
Balsam poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	2	4	0	6	0	4	2	0	0	0	0	0	0
Quaking aspen	9	2	5	4	10	14	13	13	14	0	0	0	0
Basswood	0	0	0	0	0	1	0	0	0	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	1	0	0	0	0	0	2	0	0	9	0	0	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	0	0	0	0	0	1	0	0	0	0	0	0	0
Paper birch	1	0	0	0	1	0	0	0	6	0	37	0	0
Other hardwoods	0	0	0	0	0	1	0	0	0	0	0	0	0
Noncommercial species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	62	40	22	22	54	90	76	65	115	9	236	240	0
All species	571	161	198	272	597	809	684	805	865	699	866	720	207
Number of plots	346	35	40	31	56	76	52	24	21	7	2	1	1
Standard error[3/]	25	30	32	62	52	53	61	99	94	197	52	R	R
Average basal area	65	27	45	59	65	86	75	71	68	70	74	56	30

[1/] Table may not add to totals due to rounding. Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average volume per acre for all ages in the forest type and index range.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 2.--Cubic foot volume per acre in growing-stock trees by species group and stand-age class, Michigan, 1980[1/]

Red pine forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	48	8	1	5	5	38	17	267	86	204	290	323	0
Red pine	690	56	181	719	852	882	655	793	980	869	1,332	1,022	605
Jack pine	69	25	13	50	87	189	94	6	136	29	0	85	0
White spruce	6	5	0	1	5	0	0	0	21	0	72	46	0
Black spruce	4	0	0	0	3	8	0	8	0	7	16	32	0
Balsam fir	7	13	0	9	1	0	0	31	0	0	13	32	0
Hemlock	2	0	0	0	0	0	0	49	0	0	0	0	0
Tamarack	1	0	0	0	4	0	0	0	0	0	0	0	0
Northern white-cedar	2	0	0	1	4	0	0	6	0	0	0	16	0
Other softwoods	5	0	12	2	7	0	0	45	0	0	0	0	0
Total	833	107	208	789	968	1,117	765	1,205	1,223	1,111	1,724	1,557	605
Hardwoods:													
Select white oaks	9	0	6	9	20	12	21	0	8	0	0	0	0
Select red oaks	22	0	9	3	15	39	41	30	27	143	91	75	0
Other red oaks	11	0	0	11	27	7	0	0	0	0	0	44	0
Hickory	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow birch	0	0	0	0	0	0	0	0	0	0	0	0	0
Hard maple	3	0	5	6	0	0	0	10	0	0	0	0	0
Soft maple	13	0	5	4	22	12	0	74	8	14	14	28	67
Beech	0	0	0	0	0	0	0	0	0	0	0	0	0
Ash	1	0	0	1	0	5	0	0	0	0	0	0	0
Balsam poplar	0	0	0	0	0	0	0	0	0	0	0	5	0
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	21	0	15	13	15	23	0	22	23	160	0	26	320
Quaking aspen	14	19	9	5	13	9	0	65	0	71	21	20	135
Basswood	1	0	0	2	0	5	0	0	0	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	3	0	0	0	0	0	0	0
Black cherry	4	0	4	5	0	8	0	19	0	0	0	12	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper birch	7	0	5	1	5	0	0	0	0	91	0	42	144
Other hardwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Noncommercial species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	108	19	57	61	118	123	62	220	66	479	126	252	666
All species	941	126	265	850	1,086	1,240	827	1,425	1,289	1,590	1,850	1,809	1,271
Number of plots	226	12	32	68	41	26	7	9	9	7	4	10	1
Standard error[3/]	49	49	49	75	120	102	108	199	141	354	665	232	R
Average basal area	97	35	49	112	119	101	57	112	90	119	123	117	86

[1/] Table may not add to totals due to rounding. Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average volume per acre for all ages in the forest type and index range.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 3.--Cubic foot volume per acre in growing-stock trees by species group and stand-age class, Michigan, 1980[1/]

White pine forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	713	59	278	141	399	343	450	810	839	1,029	843	1,007	1,234
Red pine	91	41	86	34	0	178	109	84	104	76	140	43	61
Jack pine	19	0	0	0	0	18	32	0	58	5	30	40	0
White spruce	44	25	43	29	0	17	66	98	10	17	27	82	92
Black spruce	19	0	0	0	60	9	19	6	17	62	17	13	20
Balsam fir	27	13	13	18	0	31	32	48	5	57	9	13	45
Hemlock	13	0	0	0	0	4	25	17	27	0	27	29	0
Tamarack	3	0	0	0	0	0	0	0	0	0	28	0	0
Northern white-cedar	14	0	36	0	0	0	14	28	28	29	0	13	0
Other softwoods	8	0	0	6	0	82	0	0	0	0	0	0	0
Total	950	137	457	228	460	680	748	1,091	1,088	1,275	1,122	1,240	1,452
Hardwoods:													
Select white oaks	18	0	48	0	0	0	8	12	0	0	112	0	0
Select red oaks	25	0	0	23	0	81	0	44	10	14	58	24	8
Other réd oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Hickory	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow birch	2	0	0	0	0	0	0	0	0	0	0	7	14
Hard maple	18	0	0	0	0	0	0	0	0	46	37	50	44
Soft maple	50	19	0	35	0	37	68	27	22	77	35	69	138
Beech	2	0	0	0	0	0	0	0	5	0	0	0	14
Ash	0	0	0	0	0	0	0	0	0	0	0	0	0
Balsam poplar	2	0	0	8	0	0	9	9	0	0	0	0	0
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	14	0	0	0	0	53	32	0	37	0	14	0	0
Quaking aspen	73	10	11	141	119	67	49	36	83	96	60	59	127
Basswood	1	0	0	0	61	0	0	0	0	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	4	0	0	0	0	26	6	0	0	6	0	0	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	1	0	0	0	0	0	0	6	0	5	0	0	0
Paper birch	51	0	13	0	0	78	33	124	31	95	34	45	55
Other hardwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Noncommercial species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	261	29	72	207	180	341	204	258	188	338	351	254	400
All species	1,211	166	529	435	640	1,021	952	1,348	1,275	1,613	1,472	1,494	1,852
Number of plots	102	4	6	7	2	9	9	10	13	12	12	8	10
Standard error[3/]	73	58	106	183	278	204	208	250	191	109	223	281	180
Average basal area	86	32	40	72	62	93	79	88	89	99	100	97	105

[1/] Table may not add to totals due to rounding. Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average volume per acre for all ages in the forest type and index range.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 4.--Cubic foot volume per acre in growing-stock trees by species group and stand-age class, Michigan, 1980[1/]

Exotics forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	10	0	0	0	0	0	176	0	0	0	0	0	0
Red pine	48	0	0	38	284	0	86	0	0	0	0	0	0
Jack pine	8	6	0	0	0	0	133	0	0	0	0	0	0
White spruce	0	0	0	0	0	0	0	0	0	0	0	0	0
Black spruce	0	0	0	0	0	0	0	0	0	0	0	0	0
Balsam fir	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemlock	0	0	0	0	0	0	0	0	0	0	0	0	0
Tamarack	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern white-cedar	1	0	0	0	0	49	0	0	0	0	0	0	0
Other softwoods	275	28	129	376	496	516	722	0	0	0	0	0	0
Total	342	34	129	414	780	565	1,117	0	0	0	0	0	0
Hardwoods:													
Select white oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Select red oaks	5	0	0	15	0	0	0	0	0	0	0	0	0
Other red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Hickory	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow birch	2	0	6	0	0	0	0	0	0	0	0	0	0
Hard maple	9	0	13	0	40	0	0	0	0	0	0	0	0
Soft maple	0	0	0	0	0	0	0	0	0	0	0	0	0
Beech	0	0	0	0	0	0	0	0	0	0	0	0	0
Ash	0	0	0	0	0	0	0	0	0	0	0	0	0
Balsam poplar	5	0	0	14	0	0	0	0	0	0	0	0	0
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	0	0	0	0	0	0	0	0	0	0	0	0	0
Quaking aspen	12	0	4	0	30	264	0	0	0	0	0	0	0
Basswood	2	0	0	0	20	0	0	0	0	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	8	0	6	0	57	0	0	0	0	0	0	0	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	1	0	0	0	0	51	0	0	0	0	0	0	0
Paper birch	0	0	0	0	0	0	0	0	0	0	0	0	0
Other hardwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Noncommercial species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	43	0	28	29	148	315	0	0	0	0	0	0	0
All species	385	34	157	443	929	880	1,117	0	0	0	0	0	0
Number of plots	37	6	12	12	4	1	2	0	0	0	0	0	0
Standard error[3/]	69	17	42	99	164	R	521	0	0	0	0	0	0
Average basal area	76	31	58	101	109	101	92	0	0	0	0	0	0

[1/] Table may not add to totals due to rounding. Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average volume per acre for all ages in the forest type and index range.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 5.--Cubic foot volume per acre in growing-stock trees by species group and stand-age class, Michigan, 1980[1/]

Black spruce forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	30	17	18	19	12	41	28	18	93	0	145	60	140
Red pine	12	5	22	0	0	23	26	11	0	0	0	30	0
Jack pine	18	27	19	26	3	7	20	25	0	0	0	60	0
White spruce	10	0	1	3	4	32	1	23	0	0	0	105	13
Black spruce	266	147	139	155	245	332	428	410	547	934	402	282	205
Balsam fir	39	19	7	24	27	54	50	80	24	0	108	106	165
Hemlock	4	0	9	6	0	1	2	0	0	0	0	15	44
Tamarack	25	21	16	17	30	50	33	45	5	0	0	0	0
Northern white-cedar	48	4	20	15	9	34	26	42	149	0	238	363	477
Other softwoods	0	0	0	0	0	0	1	0	0	0	0	0	0
Total	453	239	251	265	329	576	615	654	818	934	893	1,020	1,044
Hardwoods:													
Select white oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Select red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Other red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Hickory	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow birch	2	0	0	0	0	0	2	2	0	0	0	25	35
Hard maple	0	0	0	0	2	0	0	0	0	0	13	0	0
Soft maple	10	2	3	5	16	7	8	19	39	0	0	47	29
Beech	0	0	0	0	0	0	0	0	0	0	0	0	0
Ash	2	0	0	0	0	0	0	5	0	0	0	0	73
Balsam poplar	3	2	0	0	0	13	2	5	0	0	0	0	0
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	3	18	0	0	7	2	0	0	0	0	0	0	0
Quaking aspen	27	19	12	11	49	49	28	32	8	0	0	150	0
Basswood	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	1	0	0	0	0	2	3	0	0	0	0	0	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper birch	27	13	6	11	23	67	33	42	77	0	90	0	0
Other hardwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Noncommercial species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	74	54	22	26	98	140	76	107	124	0	103	223	136
All species	527	294	273	291	427	717	691	760	942	934	995	1,242	1,180
Number of plots	244	32	44	39	21	29	32	20	9	2	4	6	6
Standard error	28	56	33	34	94	66	59	106	226	295	178	180	254
Average basal area	70	37	47	60	78	82	82	91	117	101	100	122	123

[1/] Table may not add to totals due to rounding. Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average volume per acre for all ages in the forest type and index range.

Table 6.--Cubic foot volume per acre in growing-stock trees by species group and stand-age class, Michigan, 1980[1/]

Balsam fir forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	41	12	5	13	16	43	42	23	58	82	127	151	207
Red pine	7	2	2	0	2	2	8	15	0	0	121	0	0
Jack pine	1	0	0	0	7	0	0	3	0	0	0	10	0
White spruce	93	59	17	14	104	130	85	123	148	175	181	121	105
Black spruce	45	40	28	55	34	59	51	67	51	51	22	7	11
Balsam fir	340	97	93	126	388	487	425	450	548	521	417	251	386
Hemlock	14	0	8	13	16	10	9	23	5	34	34	60	0
Tamarack	9	9	32	4	10	12	0	0	6	7	0	7	0
Northern white-cedar	92	41	28	89	95	68	71	113	95	164	315	272	159
Other softwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	641	261	213	314	673	812	691	817	912	1,032	1,218	879	867
Hardwoods:													
Select white oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Select red oaks	1	0	0	0	0	0	6	0	0	0	0	0	0
Other red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Hickory	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow birch	18	0	0	4	18	34	12	7	23	44	36	69	46
Hard maple	9	0	5	2	2	21	3	24	3	11	20	35	0
Soft maple	61	28	21	5	34	91	75	98	37	101	133	115	118
Beech	0	0	0	0	5	0	0	0	0	0	0	0	0
Ash	7	4	1	1	13	2	3	8	0	40	7	26	19
Balsam poplar	19	8	2	4	17	28	21	9	55	58	57	5	8
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	3	0	3	0	0	0	2	2	33	6	0	0	8
Quaking aspen	76	25	41	34	106	124	104	71	110	53	65	27	63
Basswood	0	0	0	0	2	0	0	0	0	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	6	0	0	2	0	8	2	21	3	42	0	6	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	8	0	2	1	25	10	6	2	30	4	0	5	0
Paper birch	73	48	71	17	35	58	121	120	81	59	126	84	77
Other hardwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Noncommercial species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	282	113	147	71	256	376	354	362	376	419	445	372	340
All species	924	374	360	385	929	1,187	1,045	1,179	1,288	1,451	1,664	1,251	1,207
Number of plots	336	34	39	29	33	53	52	32	21	13	9	12	9
Standard error	31	43	37	50	65	66	53	72	121	126	286	140	218
Average basal area	93	44	52	84	101	111	98	115	110	120	126	112	98

[1/] Table may not add to totals due to rounding. Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average volume per acre for all ages in the forest type and index range.

Table 7.--Cubic foot volume per acre in growing-stock trees by species group and stand-age class, Michigan, 1980[1/]

Northern white-cedar forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	28	0	8	3	16	40	15	14	8	25	50	43	77
Red pine	2	0	0	0	0	4	6	1	1	3	2	0	1
Jack pine	0	0	0	0	0	0	0	0	0	0	0	0	0
White spruce	29	10	4	1	4	3	43	20	26	30	35	51	62
Black spruce	55	36	30	39	23	51	97	41	51	69	62	59	61
Balsam fir	84	14	22	26	47	83	151	87	112	94	119	88	68
Hemlock	10	0	3	0	3	0	7	8	7	1	31	11	37
Tamarack	21	28	19	41	6	18	12	44	21	10	25	20	6
Northern white-cedar	691	171	190	249	354	431	634	793	805	745	999	900	1,023
Other softwoods	1	0	13	0	0	0	1	0	0	0	0	0	0
Total	920	259	290	359	453	631	966	1,008	1,030	977	1,322	1,172	1,335
Hardwoods:													
Select white oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Select red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Other red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Hickory	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow birch	11	0	0	1	3	0	11	16	8	12	16	15	30
Hard maple	4	0	0	0	0	0	7	0	0	2	0	4	29
Soft maple	32	0	6	8	10	31	21	29	33	57	47	50	40
Beech	0	0	0	0	0	0	0	0	0	0	0	0	0
Ash	19	0	7	1	8	23	17	27	30	31	21	22	15
Balsam poplar	16	1	3	3	3	42	17	22	25	8	39	8	17
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	3	0	0	0	0	21	2	3	1	1	0	2	6
Quaking aspen	20	18	11	2	19	12	42	21	23	25	13	17	25
Basswood	1	0	0	0	2	0	3	1	1	1	0	2	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	0	0	0	0	1	0	0	0	1	1	0	1	1
Butternut	0	0	0	0	0	0	0	0	2	0	0	0	0
Elm	2	4	3	0	3	0	3	3	1	2	0	2	0
Paper birch	70	14	12	17	42	91	92	77	88	103	89	72	64
Other hardwoods	0	0	0	0	0	0	0	0	0	1	0	0	1
Noncommercial species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	181	36	43	33	89	220	215	201	212	242	226	194	227
All species	1,100	296	333	392	542	851	1,181	1,209	1,242	1,219	1,547	1,365	1,562
Number of plots	651	15	32	51	43	37	59	76	69	71	46	82	70
Standard error	25	71	48	43	48	74	65	60	60	57	98	69	73
Average basal area	132	43	69	94	115	132	142	145	152	141	152	141	147

[1/] Table may not add to totals due to rounding. Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average volume per acre for all ages in the forest type and index range.

Table 8.--Cubic foot volume per acre in growing-stock trees by species group and stand-age class, Michigan, 1980[1/]

Tamarack forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	9	14	0	49	0	0	0	0	0	0	0	0	0
Red pine	3	18	0	0	0	0	0	0	0	0	0	0	0
Jack pine	4	0	0	0	0	0	0	38	0	0	0	0	0
White spruce	1	0	0	0	0	11	0	0	0	0	0	0	0
Black spruce	43	0	59	35	8	103	58	64	75	0	44	31	0
Balsam fir	18	0	16	7	0	45	30	17	0	0	97	0	49
Hemlock	0	0	0	0	0	0	0	0	0	0	0	0	0
Tamarack	258	163	165	170	104	75	294	385	536	1,075	447	431	664
Northern white-cedar	45	0	41	62	24	0	27	41	40	45	282	140	0
Other softwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	380	194	281	322	136	234	409	545	650	1,120	869	603	712
Hardwoods:													
Select white oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Select red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Other red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Hickory	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow birch	0	0	0	0	0	0	0	0	0	0	0	0	0
Hard maple	0	0	0	0	0	0	0	0	0	0	0	0	0
Soft maple	0	0	0	0	0	0	0	0	0	0	0	0	0
Beech	0	0	0	0	0	0	0	0	0	0	0	0	0
Ash	2	0	7	0	0	0	5	0	0	0	0	0	0
Balsam poplar	7	0	17	0	0	0	20	5	0	0	22	0	0
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	0	0	0	0	0	0	0	0	0	0	0	0	0
Quaking aspen	12	0	8	0	0	74	24	0	0	0	50	0	0
Basswood	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	0	0	0	0	0	0	0	0	0	0	0	0	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper birch	12	0	31	0	0	53	25	0	0	0	0	0	0
Other hardwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Noncommercial species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	33	0	63	0	0	127	73	5	0	0	72	0	0
All species	413	194	344	322	136	360	482	550	650	1,120	942	603	712
Number of plots	64	9	9	9	6	4	11	6	3	1	3	2	1
Standard error[3/]	46	43	98	63	41	141	125	207	328	R	343	131	R
Average basal area	55	24	45	65	51	58	74	63	57	64	75	53	49

[1/] Table may not add to totals due to rounding. Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average volume per acre for all ages in the forest type and index range.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 9.--Cubic foot volume per acre in growing-stock trees by species group and stand-age class, Michigan, 1980[1/]

White spruce forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	62	66	10	0	58	75	76	0	0	0	0	220	0
Red pine	21	0	0	332	0	10	36	0	0	86	0	14	0
Jack pine	9	26	5	0	0	35	0	0	0	0	0	0	0
White spruce	519	84	196	0	542	419	638	1,733	815	844	0	573	661
Black spruce	32	32	0	0	0	76	16	0	29	16	0	99	0
Balsam fir	115	51	48	0	12	79	152	502	67	234	0	154	445
Hemlock	1	0	0	0	0	6	0	0	0	0	0	0	0
Tamarack	5	19	0	136	0	8	0	0	0	0	0	0	0
Northern white-cedar	120	0	0	0	0	11	140	593	126	347	0	252	714
Other softwoods	7	0	0	0	57	0	0	0	0	0	0	0	0
Total	892	277	259	468	669	720	1,058	2,828	1,037	1,527	0	1,313	1,819
Hardwoods:													
Select white oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Select red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Other red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Hickory	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow birch	3	0	0	0	0	0	0	38	20	0	0	0	0
Hard maple	15	0	39	0	0	0	0	58	24	0	0	38	0
Soft maple	34	17	9	0	0	20	19	0	74	154	0	77	0
Beech	1	0	0	0	0	9	0	0	0	0	0	0	0
Ash	0	0	0	0	0	0	0	0	0	0	0	0	0
Balsam poplar	20	0	0	0	0	18	3	0	31	163	0	22	0
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	2	0	10	0	0	0	0	0	0	0	0	0	0
Quaking aspen	104	37	12	0	99	169	188	163	162	44	0	119	0
Basswood	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	5	0	0	0	43	0	0	0	0	0	0	0	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	4	0	14	0	0	9	0	0	0	0	0	0	0
Paper birch	37	0	0	0	0	105	39	0	0	18	0	105	0
Other hardwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Noncommercial species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	224	54	84	0	142	330	249	258	312	379	0	361	0
All species	1,116	331	343	468	811	1,049	1,307	3,086	1,349	1,906	0	1,674	1,819
Number of plots	52	4	9	1	6	9	7	2	3	4	0	6	1
Standard error[3/]	106	154	110	R	154	152	160	399	342	349	0	188	R
Average basal area	92	30	42	60	92	87	114	199	116	132	0	120	112

[1/] Table may not add to totals due to rounding. Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average volume per acre for all ages in the forest type and index range.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 10.--Cubic foot volume per acre in growing-stock trees by species group and stand-age class, Michigan, 1980[1/]

Oak-hickory forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	14	6	6	0	10	7	4	15	6	12	32	52	27
Red pine	16	15	19	61	41	28	13	8	3	23	8	9	4
Jack pine	20	6	7	0	35	20	35	30	22	17	14	9	22
White spruce	1	0	0	0	1	0	0	1	0	0	0	0	14
Black spruce	0	0	0	0	0	0	1	0	0	0	4	0	0
Balsam fir	1	0	0	0	0	0	6	0	0	0	0	0	6
Hemlock	0	0	0	0	0	0	0	1	0	0	0	2	0
Tamarack	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern white-cedar	0	0	0	0	0	0	0	0	0	0	0	2	3
Other softwoods	1	0	0	0	0	0	1	0	4	0	0	0	0
Total	53	27	32	61	87	55	60	54	35	51	58	73	76
Hardwoods:													
Select white oaks	202	38	98	158	111	182	139	195	307	293	293	392	305
Select red oaks	432	163	109	185	370	420	553	518	410	516	531	585	591
Other red oaks	107	21	44	153	64	158	111	131	121	157	91	122	113
Hickory	24	3	12	0	24	26	5	11	71	41	10	41	45
Yellow birch	0	0	0	0	0	0	0	0	0	1	2	1	4
Hard maple	9	0	0	0	12	8	2	6	7	6	45	19	24
Soft maple	63	32	16	18	49	65	95	69	51	81	60	87	47
Beech	2	0	4	0	0	1	2	2	2	3	4	1	0
Ash	13	1	3	16	13	23	5	10	26	11	4	18	55
Balsam poplar	0	1	0	0	1	0	0	0	0	0	0	0	0
Cottonwood	2	0	0	0	12	0	0	3	1	1	0	9	0
Bigtooth aspen	57	12	8	32	57	84	90	97	78	30	35	45	3
Quaking aspen	12	8	7	0	32	14	9	22	4	8	19	10	7
Basswood	4	0	3	0	0	8	0	6	11	3	14	3	6
Yellow-poplar	1	0	0	0	0	0	0	0	5	0	0	6	0
Black walnut	7	0	0	0	21	20	0	29	3	0	0	0	6
Black cherry	19	4	1	9	40	10	11	14	61	24	5	37	7
Butternut	1	0	0	0	5	0	0	0	3	0	0	0	0
Elm	2	0	2	5	5	0	0	4	6	1	0	1	2
Paper birch	8	0	0	0	6	5	8	10	9	19	28	10	0
Other hardwoods	4	0	1	0	5	0	3	2	6	7	15	4	7
Noncommercial species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	969	284	307	576	827	1,025	1,034	1,130	1,182	1,204	1,158	1,389	1,220
All species	1,022	311	339	637	914	1,080	1,093	1,184	1,217	1,255	1,216	1,463	1,295
Number of plots	616	62	48	8	35	68	100	72	58	52	36	58	19
Standard error	25	35	32	102	64	63	52	66	87	54	98	93	125
Average basal area	77	30	39	69	73	85	87	89	84	84	88	95	90

[1/] Table may not add to totals due to rounding. Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average volume per acre for all ages in the forest type and index range.

Table 11.--Cubic foot volume per acre in growing-stock trees by species group and stand-age class, Michigan, 1980[1/]

Elm-ash-soft maple forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	15	8	4	4	3	6	1	5	0	15	8	96	47
Red pine	2	2	0	1	0	0	5	4	8	0	0	0	0
Jack pine	0	0	0	0	0	0	0	0	0	0	0	0	0
White spruce	14	2	3	2	5	0	20	15	13	22	14	50	33
Black spruce	7	5	2	10	12	9	8	4	11	6	7	7	3
Balsam fir	40	7	19	16	33	46	54	75	25	24	71	60	92
Hemlock	19	1	6	3	9	9	17	2	22	15	80	68	53
Tamarack	5	1	3	6	7	13	13	1	2	0	0	0	10
Northern white-cedar	64	18	25	24	18	55	69	73	110	62	128	100	195
Other softwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	165	46	62	67	88	137	187	180	191	143	307	381	433
Hardwoods:													
Select white oaks	13	5	15	2	14	12	14	0	20	47	13	14	2
Select red oaks	7	1	4	1	1	12	7	8	6	27	3	11	0
Other red oaks	1	0	1	0	2	0	3	2	0	0	0	5	0
Hickory	1	1	1	0	0	0	2	0	5	0	3	5	0
Yellow birch	27	3	6	2	14	17	34	23	38	27	39	74	96
Hard maple	15	7	5	0	24	9	9	15	16	26	54	21	36
Soft maple	339	96	68	83	305	282	402	431	468	765	621	631	363
Beech	2	0	0	0	0	6	1	3	2	0	6	2	0
Ash	165	49	64	120	138	145	181	265	218	219	211	204	359
Balsam poplar	11	8	3	8	10	9	11	11	12	20	20	15	16
Cottonwood	15	13	9	23	32	5	27	5	9	0	63	7	7
Bigtooth aspen	4	4	0	7	4	7	10	1	12	4	0	0	0
Quaking aspen	37	24	19	16	77	82	47	26	19	30	46	31	28
Basswood	13	4	0	0	23	1	26	19	35	5	23	25	9
Yellow-poplar	0	0	0	0	0	0	0	0	0	6	0	0	0
Black walnut	1	0	0	0	9	0	0	0	4	0	0	0	0
Black cherry	9	4	1	24	25	18	4	3	11	6	12	2	7
Butternut	0	0	0	0	0	0	0	0	5	0	0	0	0
Elm	33	16	15	49	62	36	40	37	38	49	13	13	51
Paper birch	28	23	15	23	32	50	30	58	14	32	6	8	32
Other hardwoods	16	0	8	30	17	0	45	19	5	34	43	7	5
Noncommercial species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	737	257	235	389	789	689	894	924	937	1,296	1,178	1,073	1,011
All species	903	303	297	456	877	827	1,081	1,104	1,128	1,439	1,484	1,454	1,444
Number of plots	563	69	68	40	43	56	63	45	40	37	24	46	32
Standard error	29	32	27	50	89	61	75	103	76	115	106	118	104
Average basal area	80	34	49	61	83	79	91	95	98	100	116	107	118

[1/] Table may not add to totals due to rounding. Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average volume per acre for all ages in the forest type and index range.

Table 12.--Cubic foot volume per acre in growing-stock trees by species group and stand-age class, Michigan, 1980[1/]

Maple-birch forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	19	12	4	4	16	11	15	22	16	23	24	22	52
Red pine	3	3	1	5	2	2	1	4	7	4	1	3	1
Jack pine	1	6	7	0	0	0	0	2	0	1	0	0	0
White spruce	13	4	6	14	16	7	11	9	16	15	14	26	17
Black spruce	2	0	1	1	2	2	1	1	3	1	2	3	6
Balsam fir	32	10	14	11	48	35	26	34	39	39	31	42	43
Hemlock	74	9	9	32	18	29	37	54	64	92	151	148	239
Tamarack	0	0	0	0	0	0	0	1	0	0	1	1	0
Northern white-cedar	22	2	3	7	6	10	10	16	24	31	43	44	65
Other softwoods	1	2	0	7	3	2	0	1	1	0	0	0	0
Total	167	48	46	81	112	98	104	143	169	206	267	288	424
Hardwoods:													
Select white oaks	6	6	7	16	7	2	7	7	7	9	10	5	2
Select red oaks	28	10	31	16	14	15	35	60	23	36	24	28	27
Other red oaks	2	3	2	1	2	2	1	1	2	3	0	0	2
Hickory	3	1	5	8	2	3	2	3	3	5	10	3	0
Yellow birch	67	7	15	25	28	53	44	53	84	75	109	118	165
Hard maple	441	78	113	195	306	451	496	481	493	581	554	569	599
Soft maple	198	55	74	92	178	213	221	255	236	231	209	245	207
Beech	46	11	21	30	12	35	33	53	60	65	69	68	78
Ash	42	16	18	35	46	44	50	84	52	51	39	33	19
Balsam poplar	3	1	1	0	3	3	3	3	3	0	5	2	3
Cottonwood	2	7	1	1	6	1	1	2	0	1	0	3	1
Bigtooth aspen	21	8	8	6	32	32	39	22	18	19	15	9	8
Quaking aspen	51	31	27	45	98	70	78	52	43	50	37	34	23
Basswood	83	29	19	60	118	150	112	103	87	97	71	43	22
Yellow-poplar	1	0	1	5	0	0	1	2	0	4	1	0	4
Black walnut	0	0	1	4	0	0	0	0	0	1	2	0	0
Black cherry	27	13	19	31	43	47	23	35	33	29	18	20	9
Butternut	0	0	0	1	1	0	0	0	0	0	0	0	0
Elm	27	9	8	37	32	38	28	28	35	23	33	23	26
Paper birch	25	8	9	19	15	25	41	34	30	27	21	23	23
Other hardwoods	4	4	3	10	16	3	2	3	0	3	1	5	0
Noncommercial species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1,076	300	382	637	959	1,186	1,219	1,282	1,209	1,309	1,230	1,232	1,217
All species	1,243	347	428	719	1,071	1,284	1,322	1,425	1,378	1,516	1,497	1,520	1,641
Number of plots	2,928	220	184	84	156	405	433	231	208	237	226	348	196
Standard error	12	19	20	53	39	25	24	34	40	37	37	31	44
Average basal area	99	39	54	86	93	105	106	107	105	110	112	113	118

[1/] Table may not add to totals due to rounding. Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average volume per acre for all ages in the forest type and index range.

Table 13.--Cubic foot volume per acre in growing-stock trees by species group and stand-age class, Michigan, 1980[1/]

Aspen forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	12	6	7	16	13	7	15	10	19	18	22	96	41
Red pine	13	12	4	13	25	6	17	2	24	25	36	35	0
Jack pine	5	3	8	9	1	8	4	0	5	3	9	0	0
White spruce	20	6	5	16	17	29	30	47	22	24	24	54	0
Black spruce	4	1	2	5	2	6	9	1	1	8	0	5	15
Balsam fir	47	15	11	29	47	80	76	80	75	49	39	80	129
Hemlock	3	2	0	0	4	2	3	9	5	0	15	10	0
Tamarack	2	2	0	1	2	1	4	2	0	0	0	23	0
Northern white-cedar	33	6	6	20	21	30	39	53	86	79	158	173	490
Other softwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	138	52	44	110	133	169	197	204	236	206	304	477	676
Hardwoods:													
Select white oaks	4	3	3	2	2	3	8	2	11	2	18	5	0
Select red oaks	30	14	23	20	24	26	26	73	62	57	51	71	0
Other red oaks	2	0	2	4	2	3	1	0	4	0	3	0	0
Hickory	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow birch	2	0	0	0	3	3	4	5	2	2	13	0	0
Hard maple	18	7	7	9	24	24	18	26	52	40	27	12	0
Soft maple	64	27	31	24	79	78	90	123	92	99	72	86	130
Beech	2	1	0	3	3	4	0	4	0	0	2	0	0
Ash	10	4	3	10	17	14	9	9	25	18	13	53	0
Balsam poplar	50	8	12	41	57	74	62	51	74	99	130	335	236
Cottonwood	2	0	0	5	1	1	0	12	0	3	9	0	0
Bigtooth aspen	146	29	44	57	117	185	274	325	334	178	161	153	11
Quaking aspen	312	92	108	203	451	454	468	467	563	488	365	243	290
Basswood	6	2	1	3	3	9	2	5	22	10	40	31	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	6	6	6	14	4	6	4	5	4	4	19	6	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	5	1	5	5	5	8	10	3	4	0	2	17	0
Paper birch	54	14	19	36	51	76	78	105	70	107	83	114	91
Other hardwoods	1	1	0	0	2	0	1	0	2	0	0	0	0
Noncommercial species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	712	211	265	436	845	967	1,055	1,215	1,322	1,106	1,009	1,127	758
All species	850	263	309	546	978	1,136	1,252	1,419	1,558	1,312	1,312	1,603	1,433
Number of plots	1,529	325	252	65	133	239	222	118	64	48	34	25	4
Standard error	17	14	16	52	41	37	36	59	84	93	102	150	464
Average basal area	73	31	46	69	84	93	98	104	108	97	101	114	119

[1/] Table may not add to totals due to rounding. Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average volume per acre for all ages in the forest type and index range.

Table 14.--Cubic foot volume per acre in growing-stock trees by species group and stand-age class, Michigan, 1980[1/]

Paper birch forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	18	0	3	9	34	30	9	6	35	87	67	41	0
Red pine	10	5	0	0	10	2	4	13	49	0	45	0	0
Jack pine	10	0	0	0	0	0	35	2	0	39	0	0	0
White spruce	29	27	5	0	12	71	16	26	29	77	37	41	75
Black spruce	8	0	0	9	29	4	3	9	20	11	0	0	29
Balsam fir	62	26	35	30	118	73	48	62	54	69	98	126	223
Hemlock	10	0	11	0	9	5	21	0	18	0	0	114	0
Tamarack	3	6	0	0	0	0	6	0	0	0	0	0	41
Northern white-cedar	80	10	21	23	68	34	100	71	210	102	222	92	84
Other softwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	230	73	75	71	280	219	242	189	414	385	468	414	451
Hardwoods:													
Select white oaks	2	0	0	0	6	0	5	2	0	0	0	0	0
Select red oaks	17	0	0	0	5	17	33	6	30	99	0	0	0
Other red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Hickory	0	0	0	0	0	0	2	0	0	0	0	0	0
Yellow birch	7	0	0	0	15	3	7	6	5	10	9	147	0
Hard maple	39	10	3	0	11	52	42	49	74	52	12	0	183
Soft maple	109	19	29	22	116	146	158	83	133	118	152	318	112
Beech	2	0	0	0	0	4	5	0	0	0	0	0	0
Ash	15	0	3	0	34	14	26	18	16	0	0	0	0
Balsam poplar	14	2	2	0	12	13	24	21	3	13	0	0	28
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	26	9	0	14	18	29	14	42	64	73	35	0	0
Quaking aspen	87	18	15	96	125	123	98	75	118	36	165	78	132
Basswood	13	0	0	0	26	47	20	2	4	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	2	0	5	0	6	3	0	0	0	8	0	0	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	3	0	3	10	5	8	0	3	0	12	0	0	0
Paper birch	535	161	160	190	407	519	736	647	594	663	619	735	701
Other hardwoods	0	0	0	0	0	0	0	2	0	0	0	0	0
Noncommercial species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	869	219	221	332	785	976	1,170	957	1,041	1,084	993	1,279	1,156
All species	1,099	292	296	403	1,065	1,195	1,411	1,145	1,455	1,469	1,462	1,692	1,607
Number of plots	190	15	18	6	13	23	45	36	15	6	7	2	4
Standard error	47	73	58	87	132	92	87	95	176	124	157	215	132
Average basal area	94	38	47	75	89	103	113	98	108	124	112	116	117

[1/] Table may not add to totals due to rounding. Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average volume per acre for all ages in the forest type and index range.

Table 15.--Biomass yields per acre in all live trees by species group and stand-age class, Michigan, 1980[1/]

Jack pine forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	760	560	920	0	620	1,100	460	0	840	4,160	8,280	0	0
Red pine	2,620	1,100	1,980	1,580	4,120	3,140	2,060	1,380	4,040	4,900	5,740	0	0
Jack pine	29,840	10,500	15,620	24,760	29,180	40,200	34,340	41,040	37,840	31,140	25,500	24,380	19,700
White spruce	20	0	0	0	0	40	60	0	0	0	0	0	0
Black spruce	640	300	80	0	500	1,880	540	0	200	0	1,160	0	0
Balsam fir	40	0	0	0	60	80	20	0	140	0	0	0	0
Hemlock	0	0	0	0	0	0	0	0	0	0	0	0	0
Tamarack	0	0	0	0	60	0	0	0	0	0	0	0	0
Northern white-cedar	20	0	0	0	80	0	0	0	0	0	0	0	0
Other softwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	33,940	12,460	18,600	26,340	34,620	46,440	37,480	42,420	43,060	40,200	40,680	24,380	19,700
Hardwoods:													
Select white oaks	160	260	0	140	80	80	480	420	0	0	0	0	0
Select red oaks	2,300	3,600	1,100	140	1,520	3,720	2,260	1,040	2,800	820	12,120	19,180	0
Other red oaks	1,000	140	120	540	1,420	1,000	1,480	2,300	1,600	0	0	0	0
Hickory	20	0	0	0	0	80	0	0	0	0	0	0	0
Yellow birch	0	0	0	0	0	0	0	0	0	0	0	0	0
Hard maple	60	0	0	0	0	280	20	0	0	0	0	0	0
Soft maple	680	900	500	80	700	500	520	20	3,020	0	5,320	0	0
Beech	0	0	0	0	0	0	0	0	0	0	0	0	0
Ash	0	0	0	0	0	0	0	0	0	0	0	0	0
Balsam poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	240	440	200	1,120	0	280	140	0	0	0	0	0	0
Quaking aspen	720	80	640	180	800	940	1,220	760	680	780	0	0	0
Basswood	0	0	0	0	0	40	0	0	0	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	80	80	60	0	120	40	140	0	40	780	0	0	0
Butternut	20	0	0	0	0	80	0	0	0	0	0	0	0
Elm	20	0	0	0	0	100	0	0	0	0	0	0	0
Paper birch	120	360	100	0	200	20	0	0	340	0	2,520	0	0
Other hardwoods	0	0	0	0	0	40	0	0	0	0	0	0	0
Noncommercial species	0	0	0	0	0	40	0	0	0	0	0	0	0
Total	5,420	5,860	2,720	2,200	4,840	7,240	6,260	4,540	8,480	2,380	19,960	19,180	0
All species	39,360	18,320	21,320	28,540	39,460	53,680	43,740	46,960	51,540	42,580	60,640	43,560	19,700
Number of plots	346	35	40	31	56	76	52	24	21	7	2	1	1
Standard error[3/]	1,500	3,140	2,860	4,660	3,460	3,340	3,760	5,580	5,340	9,320	4,320	R	R
Average basal area	65	27	45	59	65	86	75	71	68	70	74	56	30

[1/] Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average biomass per acre for all ages in the forest type and index range.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 16.--Biomass yields per acre in all live trees by species group and stand-age class, Michigan, 1980[1/]

Red pine forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	2,320	300	500	240	360	1,980	940	11,100	5,280	9,280	11,720	14,600	10,540
Red pine	41,040	17,300	23,660	46,520	44,040	45,820	29,660	42,940	50,500	42,660	69,500	49,440	27,840
Jack pine	4,520	1,280	1,200	3,400	5,880	11,800	5,580	300	10,200	1,980	0	4,360	0
White spruce	240	200	0	60	200	0	0	120	1,020	0	2,800	1,740	0
Black spruce	200	0	0	0	100	320	0	280	400	260	3,540	1,140	0
Balsam fir	440	640	0	540	60	260	0	1,920	260	740	620	1,780	0
Hemlock	120	0	0	0	0	0	0	3,020	0	0	0	0	0
Tamarack	40	0	0	0	180	0	0	0	0	0	0	0	0
Northern white-cedar	140	0	0	60	180	60	0	1,060	0	0	1,040	520	0
Other softwoods	320	0	600	240	380	0	0	2,400	0	0	0	0	0
Total	49,380	19,720	25,960	51,060	51,380	60,240	36,180	63,140	67,660	54,920	89,220	73,580	38,380
Hardwoods:													
Select white oaks	740	0	660	740	1,520	780	1,400	0	500	0	0	0	0
Select red oaks	1,680	0	1,000	400	1,000	2,800	3,200	3,040	1,600	9,540	6,760	4,940	0
Other red oaks	840	0	20	940	1,760	740	0	0	0	0	0	3,300	0
Hickory	60	0	0	80	0	340	0	0	0	0	0	0	0
Yellow birch	0	0	0	0	0	0	0	0	0	0	0	0	0
Hard maple	300	0	680	600	0	0	0	580	0	0	0	0	0
Soft maple	1,420	0	1,140	600	1,380	680	0	9,860	2,220	2,560	4,020	2,360	3,460
Beech	20	0	0	0	0	0	0	0	0	0	0	400	0
Ash	100	0	0	160	140	260	0	0	0	0	0	0	0
Balsam poplar	20	0	0	0	0	0	0	0	0	0	0	260	0
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	1,500	780	860	920	1,300	1,260	0	1,440	1,080	12,320	2,480	1,180	20,880
Quaking aspen	1,320	1,660	840	480	1,600	1,300	0	3,920	420	3,860	1,520	3,960	6,240
Basswood	60	0	0	120	0	220	0	0	0	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	20	0	0	0	0	180	0	0	0	0	0	0	0
Black cherry	480	0	1,060	460	20	1,020	0	900	0	0	0	600	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper birch	580	0	500	100	360	0	0	360	0	5,960	0	3,920	7,700
Other hardwoods	60	0	40	100	0	140	0	0	0	0	0	0	0
Noncommercial species	20	0	40	0	0	20	0	320	0	0	0	0	0
Total	9,220	2,440	6,840	5,700	9,080	9,740	4,600	20,420	5,820	34,240	14,780	20,920	38,280
All species	58,600	22,160	32,800	56,760	60,460	69,980	40,780	83,560	73,480	89,160	104,000	94,500	76,660
Number of plots	226	12	32	68	41	26	7	9	9	7	4	10	1
Standard error[3/]	2,520	7,240	4,480	4,160	6,420	5,720	5,220	11,180	7,760	18,040	30,300	10,460	R
Average basal area	97	35	49	112	119	101	57	112	90	119	123	117	86

[1/] Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average biomass per acre for all ages in the forest type and index range.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 17.--Biomass yields per acre in all live trees by species group and stand-age class, Michigan, 1980[1/]

White pine forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	32,220	9,660	13,200	8,880	19,300	19,480	21,660	36,960	39,340	42,400	35,940	45,460	51,380
Red pine	4,700	1,940	4,700	3,580	0	9,500	5,120	3,820	5,480	4,300	6,800	1,900	2,820
Jack pine	1,220	0	0	0	0	1,500	2,740	0	3,020	300	1,840	2,640	0
White spruce	1,900	940	2,640	2,240	0	720	2,600	3,660	360	1,400	1,020	3,060	3,460
Black spruce	1,300	0	0	0	2,920	300	2,740	200	1,700	3,520	1,680	520	820
Balsam fir	2,720	680	620	1,820	0	1,440	2,480	5,640	260	7,580	2,660	1,160	3,100
Hemlock	780	0	0	0	0	200	1,380	820	1,860	20	1,460	1,800	60
Tamarack	200	0	0	0	0	0	200	0	0	0	1,420	100	0
Northern white-cedar	740	0	1,200	0	0	0	460	3,700	860	960	0	640	0
Other softwoods	420	0	0	1,280	0	3,880	0	0	0	0	0	0	0
Total	46,200	13,220	22,360	17,800	22,220	37,020	39,380	54,800	52,880	60,480	52,820	57,280	61,640
Hardwoods:													
Select white oaks	1,260	0	3,380	0	0	0	560	760	0	0	8,000	0	0
Select red oaks	1,900	0	0	1,440	0	5,920	420	3,540	640	1,040	3,740	2,520	500
Other red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Hickory	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow birch	200	0	0	0	0	0	0	0	0	700	0	400	800
Hard maple	1,900	0	0	0	0	0	0	0	0	4,940	4,680	6,100	2,880
Soft maple	4,780	13,100	1,940	5,380	0	3,080	4,700	1,620	1,700	6,340	4,580	4,900	10,800
Beech	400	1,860	0	0	0	0	0	0	620	0	0	0	2,580
Ash	140	0	0	0	0	0	0	0	340	740	0	0	60
Balsam poplar	120	0	0	640	0	0	420	400	0	0	0	0	0
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	920	0	0	0	0	4,220	1,740	0	2,280	0	920	0	0
Quaking aspen	5,220	3,660	1,520	7,940	7,220	4,380	3,940	2,880	6,860	5,960	5,600	4,040	7,480
Basswood	60	0	0	0	2,580	0	0	0	0	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	320	0	0	0	0	2,560	380	0	0	500	0	0	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	80	0	0	0	0	0	280	320	0	260	0	0	0
Paper birch	3,160	0	680	520	0	4,520	2,700	7,220	2,560	5,380	2,660	2,420	2,900
Other hardwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Noncommercial species	20	0	0	0	0	0	0	0	0	100	0	0	0
Total	20,480	18,620	7,520	15,920	9,800	24,680	15,140	16,740	15,000	25,960	30,180	20,380	28,000
All species	66,680	31,840	29,880	33,720	32,020	61,700	54,520	71,540	67,880	86,440	83,000	77,660	89,640
Number of plots	102	4	6	7	2	9	9	10	13	12	12	8	10
Standard error	3,540	10,920	5,900	11,580	10,460	8,040	9,280	13,780	7,340	6,800	12,580	13,960	8,900
Average basal area	86	32	40	72	62	93	79	88	89	99	100	97	105

[1/] Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average biomass per acre for all ages in the forest type and index range.

Table 18.--Biomass yields per acre in all live trees by species group and stand-age class, Michigan, 1980[1/]

Exotics forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	360	0	0	0	0	0	6,740	0	0	0	0	0	0
Red pine	3,300	0	600	2,960	16,900	0	6,100	0	0	0	0	0	0
Jack pine	1,000	3,800	0	0	0	0	7,080	0	0	0	0	0	0
White spruce	500	0	0	1,520	0	0	0	0	0	0	0	0	0
Black spruce	0	0	0	0	0	0	0	0	0	0	0	0	0
Balsam fir	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemlock	0	0	0	0	0	0	0	0	0	0	0	0	0
Tamarack	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern white-cedar	40	0	0	0	0	1,560	0	0	0	0	0	0	0
Other softwoods	30,220	7,380	26,540	40,700	37,180	51,100	33,520	0	0	0	0	0	0
Total	35,420	11,180	27,140	45,180	54,080	52,660	53,440	0	0	0	0	0	0
Hardwoods:													
Select white oaks	100	0	0	0	980	0	0	0	0	0	0	0	0
Select red oaks	720	0	0	1,900	0	0	1,960	0	0	0	0	0	0
Other red oaks	280	1,720	0	0	0	0	0	0	0	0	0	0	0
Hickory	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow birch	120	0	360	0	0	0	0	0	0	0	0	0	0
Hard maple	1,560	0	3,420	0	4,160	0	0	0	0	0	0	0	0
Soft maple	0	0	0	0	0	0	0	0	0	0	0	0	0
Beech	0	0	0	0	0	0	0	0	0	0	0	0	0
Ash	0	0	0	0	0	0	0	0	0	0	0	0	0
Balsam poplar	780	0	0	2,400	0	0	0	0	0	0	0	0	0
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	860	0	0	0	0	0	16,020	0	0	0	0	0	0
Quaking aspen	1,720	0	3,540	0	1,420	15,240	0	0	0	0	0	0	0
Basswood	100	0	0	0	860	0	0	0	0	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	840	0	280	1,300	2,960	0	0	0	0	0	0	0	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	80	0	0	0	0	3,140	0	0	0	0	0	0	0
Paper birch	0	0	0	0	0	0	0	0	0	0	0	0	0
Other hardwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Noncommercial species	120	0	0	0	1,080	0	0	0	0	0	0	0	0
Total	7,280	1,720	7,600	5,600	11,460	18,380	17,980	0	0	0	0	0	0
All species	42,700	12,900	34,740	50,780	65,540	71,040	71,420	0	0	0	0	0	0
Number of plots	37	6	12	12	4	1	2	0	0	0	0	0	0
Standard error[3/]	5,180	4,240	7,680	10,640	8,580	R	10,360	0	0	0	0	0	0
Average basal area	76	31	58	101	109	101	92	0	0	0	0	0	0

[1/] Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average biomass per acre for all ages in the forest type and index range.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 19.--Biomass yields per acre in all live trees by species group and stand-age class, Michigan, 1980[1/]

Black spruce forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	1,380	680	1,000	980	900	1,760	1,220	860	3,760	0	5,940	2,420	5,980
Red pine	720	220	1,680	160	0	1,080	1,180	480	0	0	0	1,380	0
Jack pine	1,260	1,420	1,360	2,340	160	380	1,380	1,820	0	0	0	3,140	0
White spruce	440	0	40	220	160	1,220	40	860	0	0	0	6,180	480
Black spruce	20,380	9,840	13,560	21,220	25,020	22,640	25,340	30,660	29,140	74,720	21,440	13,440	8,300
Balsam fir	3,800	1,360	2,040	3,340	2,340	4,400	4,700	6,800	2,160	0	5,460	8,600	17,920
Hemlock	260	0	560	300	0	80	80	0	0	0	0	820	2,900
Tamarack	2,320	1,880	2,480	2,060	4,340	3,680	2,060	2,240	260	0	900	0	100
Northern white-cedar	3,060	500	1,720	1,260	320	2,660	1,840	3,400	8,920	0	9,360	21,420	24,420
Other softwoods	0	0	0	0	0	0	60	0	0	0	0	0	0
Total	33,620	15,900	24,440	31,880	33,240	37,900	37,900	47,120	44,240	74,720	43,100	57,400	60,100
Hardwoods:													
Select white oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Select red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Other red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Hickory	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow birch	140	0	0	0	0	0	100	140	0	0	0	2,280	2,720
Hard maple	40	0	0	0	140	0	0	180	120	0	880	0	0
Soft maple	1,460	380	220	2,000	1,260	2,420	700	1,160	3,700	0	4,660	2,700	7,480
Beech	0	0	0	0	0	0	0	0	0	0	0	0	0
Ash	160	0	0	0	0	0	0	760	0	0	0	0	4,280
Balsam poplar	260	140	40	0	0	800	220	1,260	0	0	0	0	0
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	140	820	0	0	340	100	0	0	0	0	0	0	0
Quaking aspen	2,260	1,640	1,380	1,620	2,880	3,840	2,160	2,660	740	0	0	12,560	0
Basswood	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	40	0	0	80	0	80	160	0	40	0	0	0	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	60	0	0	0	0	260	200	0	0	0	0	0	0
Paper birch	2,120	860	800	1,520	1,500	4,840	1,940	3,240	4,900	0	9,720	340	1,760
Other hardwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Noncommercial species	140	0	0	140	20	20	820	0	0	0	0	200	0
Total	6,820	3,840	2,440	5,360	6,140	12,360	6,300	9,400	9,500	0	15,260	18,080	16,240
All species	40,440	19,740	26,880	37,240	39,380	50,260	44,200	56,520	53,740	74,720	58,360	75,480	76,340
Number of plots	244	32	44	39	21	29	32	20	9	2	4	6	6
Standard error	1,740	3,140	2,480	3,700	5,960	4,760	4,840	5,400	11,800	12,440	3,920	10,280	14,880
Average basal area	70	37	47	60	78	82	82	91	117	101	100	122	123

[1/] Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average biomass per acre for all ages in the forest type and index range.

Table 20.--Biomass yields per acre in all live trees by species group and stand-age class, Michigan, 1980[1/]

Balsam fir forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	1,780	660	200	640	740	1,780	1,740	1,040	2,640	3,460	5,120	6,440	8,860
Red pine	300	100	80	0	80	80	380	680	0	0	5,400	0	0
Jack pine	120	0	0	0	800	0	0	140	0	0	0	560	0
White spruce	4,240	2,520	920	1,360	5,660	5,380	4,080	5,200	6,900	7,600	7,060	6,020	3,900
Black spruce	2,700	2,480	2,920	5,480	2,260	2,960	2,680	2,780	2,000	2,460	780	240	840
Balsam fir	27,280	10,000	14,260	28,000	31,040	33,320	30,880	35,660	35,600	32,020	25,440	23,160	28,020
Hemlock	1,000	0	540	1,380	1,320	1,040	460	1,380	680	1,920	1,820	3,900	260
Tamarack	620	440	1,740	1,100	940	920	40	0	300	320	0	340	0
Northern white-cedar	5,660	1,780	3,400	7,480	4,260	4,060	4,540	11,040	4,120	9,120	14,860	11,380	7,680
Other softwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	43,700	17,980	24,060	45,440	47,100	49,540	44,800	57,920	52,240	56,900	60,480	52,040	49,560
Hardwoods:													
Select white oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Select red oaks	60	0	20	0	0	0	380	0	0	0	0	0	0
Other red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Hickory	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow birch	1,880	0	80	1,420	2,020	2,920	1,760	800	2,960	3,300	5,780	5,540	3,040
Hard maple	1,200	0	300	520	860	2,280	1,420	1,600	1,080	1,420	1,920	3,400	720
Soft maple	5,380	2,400	2,220	2,100	3,520	7,820	5,220	7,720	5,640	9,840	10,040	8,700	9,920
Beech	40	0	0	0	260	0	0	0	0	0	0	400	0
Ash	1,060	1,040	140	1,180	1,260	300	360	1,260	1,340	5,460	3,340	2,400	1,000
Balsam poplar	1,300	1,520	240	860	1,560	1,480	1,260	400	3,440	2,960	2,780	360	360
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	260	0	160	0	0	80	200	140	2,140	280	0	0	1,300
Quaking aspen	5,400	2,340	3,140	2,880	6,740	8,540	7,240	5,280	7,100	4,500	3,080	2,020	5,120
Basswood	20	0	0	0	120	0	0	0	0	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	580	40	140	140	400	1,000	140	1,620	720	2,860	120	300	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	520	0	100	120	1,800	620	420	360	1,660	220	0	320	20
Paper birch	5,220	3,540	5,340	2,100	4,980	4,180	7,520	7,540	5,800	3,280	7,620	6,040	4,540
Other hardwoods	0	20	0	0	0	0	0	0	0	0	0	0	0
Noncommercial species	100	40	0	20	80	300	0	80	20	0	820	40	20
Total	23,020	10,940	11,880	11,340	23,600	29,520	25,920	26,800	31,900	34,120	35,500	29,520	26,040
All species	66,720	28,920	35,940	56,780	70,700	79,060	70,720	84,720	84,140	91,020	95,980	81,560	75,600
Number of plots	336	34	39	29	33	53	52	32	21	13	9	12	9
Standard error	1,840	3,180	3,700	5,580	5,040	4,300	3,820	5,080	6,700	6,720	11,900	6,800	10,740
Average basal area	93	44	52	84	101	111	98	115	110	120	126	112	98

[1/] Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average biomass per acre for all ages in the forest type and index range.

Table 21.--Biomass yields per acre in all live trees by species group and stand-age class, Michigan, 1980[1/]

Northern white-cedar forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	1,220	0	320	140	880	1,560	700	620	320	1,120	2,080	1,760	3,500
Red pine	80	0	0	0	0	200	340	40	60	120	80	0	60
Jack pine	0	0	0	0	0	0	0	0	0	0	0	0	0
White spruce	1,320	400	280	60	240	240	2,340	1,040	1,240	1,160	1,980	2,000	2,600
Black spruce	3,300	2,580	2,340	3,000	2,360	4,740	5,220	2,480	2,340	4,260	3,420	3,340	3,080
Balsam fir	9,360	1,820	5,380	6,560	10,420	9,920	12,960	9,760	12,500	8,480	9,760	10,000	7,260
Hemlock	700	0	180	0	420	0	420	720	400	60	2,240	880	2,140
Tamarack	1,940	2,580	2,480	4,380	2,660	2,380	1,440	3,280	1,640	1,300	1,560	1,080	320
Northern white-cedar	43,980	12,180	21,700	31,840	42,880	43,880	43,080	49,480	50,140	45,720	51,400	47,140	48,960
Other softwoods	80	0	1,460	0	0	0	20	0	0	0	0	0	0
Total	61,980	19,560	34,140	45,980	59,860	62,920	66,520	67,420	68,640	62,220	72,520	66,200	67,920
Hardwoods:													
Select white oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Select red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Other red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Hickory	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow birch	1,140	0	0	80	740	320	940	1,580	860	1,240	1,960	1,520	2,320
Hard maple	400	0	0	220	120	0	420	60	140	140	80	400	2,220
Soft maple	2,920	0	1,000	620	1,860	1,880	2,580	2,340	2,880	4,580	4,400	4,800	3,440
Beech	0	0	0	0	0	0	0	0	0	0	0	0	0
Ash	2,640	120	980	300	2,620	3,500	1,960	3,300	4,220	3,040	2,880	2,800	2,680
Balsam poplar	1,080	320	1,400	840	500	2,620	1,320	1,300	1,460	400	2,080	380	880
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	160	0	0	0	0	1,080	240	160	60	40	0	100	280
Quaking aspen	1,600	820	1,920	900	2,040	1,300	2,580	1,880	1,560	1,880	760	1,060	1,760
Basswood	60	0	0	0	80	0	300	100	40	40	0	120	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	20	0	40	0	60	40	0	0	60	60	0	40	40
Butternut	0	0	0	0	0	0	0	0	80	0	0	0	0
Elm	160	260	140	0	160	0	280	340	280	140	0	220	0
Paper birch	5,420	1,420	2,600	2,460	4,380	8,720	7,980	5,700	6,420	6,800	6,120	4,820	3,960
Other hardwoods	20	0	0	0	0	120	0	0	0	40	0	0	60
Noncommercial species	100	0	20	20	20	40	80	80	40	140	60	80	320
Total	15,720	2,940	8,100	5,440	12,580	19,620	18,680	16,840	18,100	18,540	18,340	16,340	17,960
All species	77,700	22,500	42,240	51,420	72,440	82,540	85,200	84,260	86,740	80,760	90,860	82,540	85,880
Number of plots	651	15	32	51	43	37	59	76	69	71	46	82	70
Standard error	1,380	5,020	5,520	3,760	4,500	5,480	4,420	3,700	3,920	3,640	5,180	3,820	3,640
Average basal area	132	43	69	94	115	132	142	145	152	141	152	141	147

[1/] Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average biomass per acre for all ages in the forest type and index range.

Table 22.--Biomass yields per acre in all live trees by species group and stand-age class, Michigan, 1980[1/]

Tamarack forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	520	740	0	2,940	0	0	0	0	0	0	0	0	0
Red pine	120	800	0	0	0	0	0	0	0	0	0	0	0
Jack pine	180	0	0	0	0	0	0	1,980	0	0	0	0	0
White spruce	40	0	0	0	140	420	0	0	0	0	0	0	0
Black spruce	3,280	0	3,880	4,680	1,500	6,840	5,100	3,080	4,880	0	1,900	1,080	0
Balsam fir	2,100	80	4,620	720	0	2,400	4,420	780	0	0	5,220	2,580	2,280
Hemlock	0	0	0	0	0	0	0	0	0	0	0	0	0
Tamarack	22,240	15,580	13,360	33,060	20,800	13,140	23,380	21,200	31,860	52,960	23,120	26,560	33,040
Northern white-cedar	3,280	560	2,420	5,040	5,160	0	3,960	1,300	1,980	1,380	12,140	5,580	0
Other softwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	31,760	17,760	24,280	46,440	27,600	22,800	36,860	28,340	38,720	54,340	42,380	35,800	35,320
Hardwoods:													
Select white oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Select red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Other red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Hickory	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow birch	0	0	0	0	0	0	0	0	0	0	0	0	0
Hard maple	0	0	0	0	0	0	0	0	0	0	0	0	0
Soft maple	480	0	1,000	1,220	480	0	0	0	0	0	80	3,780	0
Beech	0	0	0	0	0	0	0	0	0	0	0	0	0
Ash	180	0	360	0	0	0	520	0	0	0	620	0	0
Balsam poplar	440	0	1,020	0	0	0	1,180	260	0	0	1,080	840	0
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	0	0	0	0	0	0	0	0	0	0	0	0	0
Quaking aspen	760	0	360	0	0	6,400	1,160	0	0	0	2,360	0	0
Basswood	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	0	0	0	0	0	0	0	0	0	0	0	0	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper birch	960	0	3,200	0	0	2,800	1,680	580	0	0	0	0	0
Other hardwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Noncommercial species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2,820	0	5,940	1,220	480	9,200	4,540	840	0	0	4,140	4,620	0
All species	34,580	17,760	30,220	47,660	28,080	32,000	41,400	29,180	38,720	54,340	46,520	40,420	35,320
Number of plots	64	9	9	9	6	4	11	6	3	1	3	2	1
Standard error[3/]	2,900	2,780	9,500	6,400	7,660	7,560	8,360	11,120	19,880	R	15,340	9,400	R
Average basal area	55	24	45	65	51	58	74	63	57	64	75	53	49

[1/] Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average biomass per acre for all ages in the forest type and index range.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 23.--Biomass yields per acre in all live trees by species group and stand-age class, Michigan, 1980[1/]

White spruce forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	3,120	2,620	540	0	3,480	3,320	4,540	0	0	780	0	10,220	0
Red pine	1,000	0	0	17,620	0	440	1,620	0	0	3,780	0	700	0
Jack pine	540	1,340	260	0	0	2,260	0	0	0	0	0	0	0
White spruce	25,160	3,280	16,620	8,980	32,080	19,140	32,840	71,460	36,800	31,780	0	22,660	25,460
Black spruce	1,500	1,340	0	0	0	2,680	2,540	0	2,600	620	0	3,420	0
Balsam fir	8,360	4,040	2,960	0	600	4,740	11,860	28,580	9,460	16,440	0	12,340	37,220
Hemlock	60	0	0	0	0	340	0	0	0	0	0	0	0
Tamarack	280	960	0	6,680	0	400	0	0	0	0	0	0	0
Northern white-cedar	6,480	0	0	0	0	360	11,740	33,100	4,600	19,840	0	11,040	26,640
Other softwoods	860	0	2,100	0	4,220	0	0	0	0	0	0	0	0
Total	47,360	13,580	22,480	33,280	40,380	33,680	65,140	133,140	53,460	73,240	0	60,380	89,320
Hardwoods:													
Select white oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Select red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Other red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Hickory	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow birch	260	0	0	0	0	0	0	5,240	1,160	0	0	0	0
Hard maple	1,320	0	2,280	0	0	0	0	8,620	1,420	0	0	4,400	0
Soft maple	3,240	1,120	440	0	0	3,420	2,960	0	13,940	10,000	0	4,400	0
Beech	320	0	0	0	0	1,860	0	0	0	0	0	0	0
Ash	100	0	0	0	0	0	0	2,400	0	0	0	0	0
Balsam poplar	1,380	0	0	0	0	1,820	160	0	3,620	7,020	0	2,060	2,760
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	80	0	460	0	0	0	0	0	0	0	0	0	0
Quaking aspen	8,980	2,620	4,240	0	8,240	12,380	11,960	8,020	15,560	4,760	0	15,340	0
Basswood	60	0	0	0	0	340	0	0	0	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	360	0	0	0	2,440	0	0	0	620	0	0	300	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	220	0	800	0	0	500	0	0	0	0	0	0	0
Paper birch	2,440	0	0	0	0	5,960	3,000	0	0	3,620	0	6,300	0
Other hardwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Noncommercial species	20	0	0	0	0	0	120	0	0	0	0	0	0
Total	18,780	3,740	8,220	0	10,680	26,280	18,200	24,280	36,320	25,400	0	32,800	2,760
All species	66,140	17,320	30,700	33,280	51,060	59,960	83,340	157,420	89,780	98,640	0	93,180	92,080
Number of plots	52	4	9	1	6	9	7	2	3	4	0	6	1
Standard error[3/]	5,660	5,100	8,380	R	11,080	9,320	10,400	22,360	22,520	19,280	0	10,880	R
Average basal area	92	30	42	60	92	87	114	199	116	132	0	120	112

[1/] Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average biomass per acre for all ages in the forest type and index range.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 24.--Biomass yields per acre in all live trees by species group and stand-age class, Michigan, 1980[1/]

Oak-hickory forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	820	560	380	0	580	420	460	940	680	760	1,640	2,140	1,160
Red pine	980	780	1,060	8,140	2,460	1,360	760	580	140	1,740	400	420	200
Jack pine	1,460	580	1,660	1,000	2,820	1,160	2,000	1,820	1,340	1,520	1,000	620	1,860
White spruce	40	0	0	0	420	0	0	20	0	0	0	40	520
Black spruce	20	0	0	0	0	0	20	0	0	0	280	0	0
Balsam fir	120	0	0	0	0	20	440	0	0	0	20	220	800
Hemlock	20	0	0	0	0	0	0	40	0	0	0	120	0
Tamarack	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern white-cedar	20	0	0	0	0	0	0	0	0	0	0	60	200
Other softwoods	40	0	80	0	0	0	60	0	200	0	0	0	0
Total	3,520	1,920	3,180	9,140	6,280	2,960	3,740	3,400	2,360	4,020	3,340	3,620	4,740
Hardwoods:													
Select white oaks	15,580	3,980	8,800	12,680	9,580	14,480	10,920	14,580	22,960	21,540	23,220	28,260	23,060
Select red oaks	30,480	12,440	8,520	16,720	27,300	29,800	39,180	36,180	28,340	35,520	38,820	39,280	41,560
Other red oaks	7,780	1,420	4,380	10,020	5,180	11,280	8,380	9,220	8,200	11,440	6,180	9,260	7,140
Hickory	1,900	440	1,260	0	2,440	2,080	500	720	5,300	3,280	720	3,300	3,120
Yellow birch	60	0	0	0	0	0	0	0	0	180	80	240	400
Hard maple	780	20	0	0	920	700	320	620	620	340	3,000	1,840	2,700
Soft maple	5,340	2,980	2,080	2,500	3,140	5,840	7,620	6,080	4,920	5,700	4,900	6,640	7,240
Beech	160	20	220	0	0	60	300	140	120	220	640	60	0
Ash	840	80	380	800	880	1,280	320	720	1,620	740	380	1,140	4,000
Balsam poplar	0	60	0	0	60	0	0	0	0	0	0	0	0
Cottonwood	140	0	0	0	620	0	40	200	80	120	0	640	0
Bigtooth aspen	3,320	880	940	4,140	2,880	4,480	5,200	5,340	4,480	2,060	1,860	2,780	380
Quaking aspen	1,020	780	1,260	0	2,440	880	860	1,660	740	720	1,100	680	520
Basswood	260	0	160	0	80	400	60	260	800	200	740	160	600
Yellow-poplar	40	0	0	0	0	0	0	0	240	0	0	280	0
Black walnut	480	0	0	0	1,440	1,460	0	1,840	180	0	0	0	360
Black cherry	1,320	540	780	440	2,240	760	800	880	3,440	1,720	660	2,200	1,100
Butternut	60	0	0	0	620	0	0	0	220	0	0	0	0
Elm	260	0	280	300	640	80	20	440	580	120	0	220	1,480
Paper birch	580	0	200	0	440	280	560	560	520	1,020	1,980	920	140
Other hardwoods	600	260	180	920	420	60	260	680	860	1,160	1,740	780	1,160
Noncommercial species	420	660	420	480	860	240	180	180	980	200	340	120	1,740
Total	71,420	24,560	29,860	49,000	62,180	74,160	75,520	80,300	85,200	86,280	86,360	98,800	96,700
All species	74,940	26,480	33,040	58,140	68,460	77,120	79,260	83,700	87,560	90,300	89,700	102,420	101,440
Number of plots	616	62	48	8	35	68	100	72	58	52	36	58	19
Standard error	1,640	2,820	2,620	5,120	4,000	4,040	3,580	4,500	5,380	3,780	6,640	5,660	8,940
Average basal area	77	30	39	69	73	85	87	89	84	84	88	95	90

[1/] Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average biomass per acre for all ages in the forest type and index range.

Table 25.--Biomass yields per acre in all live trees by species group and stand-age class, Michigan, 1980[1/]

Elm-ash-soft maple forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	680	320	340	180	120	220	60	180	60	600	400	4,380	2,040
Red pine	80	120	0	60	0	0	240	180	400	0	0	0	0
Jack pine	20	100	0	20	0	0	0	0	0	0	0	0	0
White spruce	600	80	120	60	200	280	820	580	640	1,320	540	1,960	1,240
Black spruce	320	440	60	340	480	300	300	120	500	220	260	520	420
Balsam fir	3,440	480	2,000	2,140	2,540	4,640	4,440	4,760	3,020	1,820	8,400	4,920	6,420
Hemlock	1,260	100	380	180	500	760	1,440	180	1,520	1,040	5,200	4,160	2,960
Tamarack	300	200	140	320	660	680	700	80	100	0	0	0	500
Northern white-cedar	3,580	1,240	1,260	3,020	1,380	3,300	4,040	4,260	6,200	2,620	7,620	5,220	8,460
Other softwoods	0	0	0	40	0	0	0	0	0	0	0	0	0
Total	10,280	3,080	4,300	6,360	5,880	10,180	12,040	10,340	12,440	7,620	22,420	21,160	22,040
Hardwoods:													
Select white oaks	980	280	1,260	120	940	1,020	1,120	0	1,720	3,320	940	1,100	180
Select red oaks	500	100	400	80	200	940	600	500	400	1,740	240	720	0
Other red oaks	100	0	60	0	120	0	460	100	0	0	0	360	0
Hickory	100	60	180	0	0	0	180	0	340	0	200	320	0
Yellow birch	2,640	600	660	720	1,380	1,980	3,240	2,720	3,160	2,300	4,740	5,700	9,080
Hard maple	1,520	480	880	40	1,960	980	1,120	1,580	1,340	3,480	4,500	1,780	3,400
Soft maple	22,920	7,240	9,140	6,840	22,880	19,460	24,740	27,140	31,920	46,280	41,660	39,320	26,900
Beech	120	0	60	0	0	340	80	220	140	0	460	260	0
Ash	14,360	5,200	8,460	16,660	14,820	12,740	15,860	21,320	18,720	15,800	16,540	14,100	24,900
Balsam poplar	640	840	400	620	560	620	540	460	580	940	1,100	640	680
Cottonwood	900	940	560	1,360	1,940	540	1,440	260	480	0	3,560	400	340
Bigtooth aspen	260	200	0	460	260	400	560	180	660	280	0	0	0
Quaking aspen	2,500	2,360	2,000	1,340	4,160	5,100	3,140	1,500	1,860	1,700	2,560	1,660	1,440
Basswood	760	200	0	0	1,080	40	1,400	980	1,880	360	1,900	1,780	620
Yellow-poplar	20	0	0	0	0	0	0	0	0	240	0	0	0
Black walnut	60	0	0	0	680	0	0	0	260	0	0	0	0
Black cherry	660	540	80	1,480	1,600	1,180	320	300	640	360	1,060	400	480
Butternut	40	0	0	0	0	0	0	0	300	80	380	0	0
Elm	3,120	1,760	2,880	4,940	6,220	2,840	3,100	3,060	2,860	3,340	1,700	1,600	3,880
Paper birch	2,040	1,540	1,760	2,120	2,100	3,720	2,380	3,160	1,160	2,240	700	880	1,780
Other hardwoods	1,320	320	1,820	2,580	1,280	0	2,860	1,200	280	2,000	3,460	700	260
Noncommercial species	500	380	400	720	540	460	140	740	700	200	1,620	420	420
Total	56,060	23,040	31,000	40,080	62,720	52,360	63,280	65,420	69,400	84,660	87,320	72,140	74,360
All species	66,340	26,120	35,300	46,440	68,600	62,540	75,320	75,760	81,840	92,280	109,740	93,300	96,400
Number of plots	563	69	68	40	43	56	63	45	40	37	24	46	32
Standard error	1,680	2,300	2,680	3,500	5,460	4,300	4,400	5,320	4,760	6,360	6,580	5,960	6,060
Average basal area	80	34	49	61	83	79	91	95	98	100	116	107	118

[1/] Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average biomass per acre for all ages in the forest type and index range.

Table 26.--Biomass yields per acre in all live trees by species group and stand-age class, Michigan, 1980[1/]

Maple-birch forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	840	580	320	380	740	500	740	1,040	740	1,120	1,040	880	2,100
Red pine	160	200	220	380	100	140	80	260	360	240	20	140	60
Jack pine	100	460	580	0	0	20	60	120	0	60	20	0	0
White spruce	580	160	340	620	760	340	480	360	760	640	620	1,120	760
Black spruce	100	40	40	60	120	100	80	100	100	40	160	180	240
Balsam fir	2,420	740	1,660	1,080	3,460	2,560	2,200	2,500	2,720	2,720	2,220	3,000	3,340
Hemlock	4,720	520	780	2,080	1,460	1,960	2,640	4,120	4,340	5,760	9,680	8,760	14,160
Tamarack	20	60	0	0	0	20	20	20	20	0	40	40	0
Northern white-cedar	1,200	180	140	1,000	640	620	540	820	1,400	1,700	2,120	2,380	3,080
Other softwoods	80	280	80	300	340	80	0	40	40	0	40	20	0
Total	10,220	3,220	4,160	5,900	7,620	6,340	6,840	9,380	10,480	12,280	15,960	16,520	23,740
Hardwoods:													
Select white oaks	480	480	480	1,260	540	180	500	520	560	620	860	380	160
Select red oaks	1,960	780	2,420	1,180	1,020	1,080	2,360	4,060	1,640	2,600	1,620	2,040	2,080
Other red oaks	120	200	220	80	140	120	100	40	180	200	0	0	140
Hickory	260	200	340	620	140	240	140	220	240	320	700	200	0
Yellow birch	6,360	1,140	2,400	2,300	2,800	5,140	4,280	5,160	7,800	6,560	10,220	11,060	14,520
Hard maple	34,920	7,260	12,220	23,500	27,920	37,540	39,820	36,260	37,960	43,120	41,620	43,040	44,520
Soft maple	13,920	5,080	7,360	10,120	13,000	14,680	15,240	16,400	15,860	15,540	14,420	16,900	14,900
Beech	3,840	1,140	2,160	2,500	1,300	2,860	3,000	4,020	5,300	5,440	5,980	5,300	6,120
Ash	2,900	1,660	1,760	3,440	3,000	3,020	3,120	5,500	3,560	3,380	2,660	2,100	1,560
Balsam poplar	160	120	140	20	140	160	180	180	180	20	300	120	220
Cottonwood	120	360	80	80	500	40	60	140	20	40	0	160	80
Bigtooth aspen	1,220	640	900	520	1,880	1,840	2,220	1,320	960	1,040	860	520	420
Quaking aspen	3,280	2,740	2,480	3,660	5,640	4,420	4,680	3,400	2,620	3,300	2,300	1,960	1,320
Basswood	4,140	1,660	1,360	3,660	5,860	7,080	5,520	4,940	4,320	4,840	3,740	2,240	1,160
Yellow-poplar	60	0	60	240	0	20	60	80	0	200	40	0	160
Black walnut	40	20	140	240	0	0	0	0	0	40	140	20	0
Black cherry	1,960	1,760	2,160	2,400	3,160	3,100	1,660	2,300	2,340	1,800	1,240	1,240	600
Butternut	20	0	20	40	80	0	0	0	20	0	0	0	0
Elm	2,080	1,380	980	3,540	2,400	2,780	2,140	2,360	2,580	1,640	2,260	1,620	1,840
Paper birch	1,660	640	720	1,680	1,000	1,500	2,500	2,260	2,000	1,840	1,440	1,560	1,620
Other hardwoods	360	740	420	760	1,500	200	240	380	80	160	140	420	20
Noncommercial species	1,400	1,280	1,200	1,780	1,500	1,380	1,320	1,760	1,340	1,420	1,300	1,380	1,340
Total	81,260	29,280	40,020	63,620	73,520	87,380	89,140	91,300	89,560	94,120	91,840	92,260	92,780
All species	91,480	32,500	44,180	69,520	81,140	93,720	95,980	100,680	100,040	106,400	107,800	108,780	116,520
Number of plots	2,928	220	184	84	156	405	433	231	208	237	226	348	196
Standard error	740	1,580	1,860	3,380	2,440	1,480	1,600	2,160	2,420	2,120	2,380	1,860	2,660
Average basal area	99	39	54	86	93	105	106	107	105	110	112	113	118

[1/] Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average biomass per acre for all ages in the forest type and index range.

Table 27.--Biomass yields per acre in all live trees by species group and stand-age class, Michigan, 1980[1/]

Aspen forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	640	360	420	740	820	440	680	480	1,160	800	1,560	4,280	1,580
Red pine	700	640	400	780	1,500	320	820	80	1,320	1,240	1,700	1,960	0
Jack pine	360	180	700	1,000	60	520	320	0	240	140	800	0	0
White spruce	960	260	300	1,560	860	1,400	1,300	2,260	840	1,480	1,160	2,140	0
Black spruce	240	80	80	440	80	380	720	80	20	480	0	480	500
Balsam fir	3,740	1,060	1,340	2,940	4,520	6,040	6,180	5,700	4,340	3,840	3,660	6,220	7,440
Hemlock	240	160	20	0	320	200	200	780	380	0	1,280	760	0
Tamarack	120	100	20	60	160	80	260	160	0	0	220	1,400	0
Northern white-cedar	1,740	360	440	1,520	1,200	1,520	2,100	2,720	4,300	3,420	8,080	9,180	17,940
Other softwoods	20	20	120	0	0	0	0	0	0	0	0	0	0
Total	8,760	3,220	3,840	9,040	9,520	10,900	12,580	12,260	12,600	11,400	18,460	26,420	27,460
Hardwoods:													
Select white oaks	400	360	300	140	200	300	700	160	980	100	1,360	380	0
Select red oaks	2,220	1,040	2,120	2,100	1,720	1,940	1,960	4,940	3,980	4,160	3,160	4,820	0
Other red oaks	140	40	160	280	160	220	160	0	220	100	320	0	0
Hickory	0	20	20	0	0	0	0	0	0	0	0	0	0
Yellow birch	280	40	100	0	360	460	500	400	160	240	1,140	0	0
Hard maple	2,000	980	580	940	2,620	2,520	2,240	2,800	4,860	6,420	2,460	1,620	0
Soft maple	5,340	2,680	2,960	2,540	6,260	6,720	7,860	8,860	6,820	7,180	6,080	6,040	8,260
Beech	140	120	60	240	280	280	20	320	0	0	260	0	0
Ash	1,040	300	660	900	1,860	1,420	980	980	2,240	1,320	1,660	3,780	1,620
Balsam poplar	2,940	720	1,140	3,180	3,180	4,300	3,400	2,880	3,920	5,440	6,800	16,860	12,160
Cottonwood	120	20	20	260	40	40	0	700	200	180	540	0	0
Bigtooth aspen	8,900	2,720	5,100	5,360	7,040	10,520	15,980	16,860	17,860	9,680	8,280	8,560	2,640
Quaking aspen	20,620	8,400	13,840	21,260	28,060	25,740	27,000	27,860	32,660	29,640	21,460	18,000	21,440
Basswood	320	120	40	140	320	420	300	240	1,060	500	2,320	1,380	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	600	660	860	1,380	340	440	540	300	640	260	1,040	480	880
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	440	140	500	320	400	800	660	260	380	200	140	1,020	0
Paper birch	3,860	1,180	1,660	2,800	3,860	5,160	5,760	7,180	4,640	7,020	5,920	7,700	4,840
Other hardwoods	60	40	80	40	80	40	60	120	340	0	0	0	0
Noncommercial species	300	280	280	640	360	280	140	420	320	520	100	560	0
Total	49,720	19,860	30,480	42,520	57,140	61,600	68,260	75,280	81,280	72,960	63,040	71,200	51,840
All species	58,480	23,080	34,320	51,560	66,660	72,500	80,840	87,540	93,880	84,360	81,500	97,620	79,300
Number of plots	1,529	325	252	65	133	239	222	118	64	48	34	25	4
Standard error	1,000	1,120	1,400	3,460	2,740	2,160	2,240	3,440	4,380	4,700	5,880	7,780	22,740
Average basal area	73	31	46	69	84	93	98	104	108	97	101	114	119

[1/] Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average biomass per acre for all ages in the forest type and index range.

Table 28.--Biomass yields per acre in all live trees by species group and stand-age class, Michigan, 1980[1/]

Paper birch forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)											
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Softwoods:													
White pine	840	0	120	360	1,340	1,200	360	680	1,580	3,740	2,600	1,640	0
Red pine	640	240	0	140	1,320	580	240	680	2,280	0	2,340	0	0
Jack pine	540	0	0	0	0	0	1,840	100	0	2,500	0	0	0
White spruce	1,360	1,020	240	0	1,040	3,580	840	1,320	1,200	2,880	1,400	1,540	2,840
Black spruce	440	80	0	300	1,020	240	100	520	2,200	540	0	0	1,000
Balsam fir	5,800	1,900	2,860	6,900	11,660	6,020	5,660	5,240	4,700	8,320	8,900	5,980	13,540
Hemlock	580	0	600	100	480	260	1,120	180	900	0	0	7,520	0
Tamarack	140	380	20	0	0	0	280	0	40	0	0	0	2,000
Northern white-cedar	4,700	2,520	2,580	6,440	3,820	1,620	4,900	5,180	9,360	10,160	7,660	3,220	3,920
Other softwoods	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	15,040	6,140	6,420	14,240	20,680	13,500	15,340	13,900	22,260	28,140	22,900	19,900	23,300
Hardwoods:													
Select white oaks	140	0	0	0	680	0	320	140	0	0	0	0	0
Select red oaks	1,440	240	0	0	360	2,120	2,580	380	2,800	6,560	0	0	1,000
Other red oaks	0	0	0	0	0	0	0	0	0	0	0	0	0
Hickory	20	0	0	0	0	0	100	0	0	0	0	0	0
Yellow birch	700	0	200	0	860	340	760	460	280	3,580	1,340	12,620	0
Hard maple	4,200	560	2,760	120	800	6,480	3,480	5,140	5,640	13,360	1,100	0	16,160
Soft maple	8,420	2,980	2,320	2,360	7,400	10,780	12,080	6,620	8,140	13,940	13,040	21,200	8,060
Beech	300	0	0	0	0	420	840	280	20	0	0	0	0
Ash	1,280	0	380	2,820	2,380	840	1,660	1,980	1,600	0	0	0	0
Balsam poplar	900	380	180	0	720	780	1,440	1,420	160	700	0	0	3,640
Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0
Bigtooth aspen	1,540	920	0	660	1,140	1,500	900	2,240	3,500	4,060	3,880	0	0
Quaking aspen	5,740	1,160	2,960	5,200	6,680	7,800	5,720	6,280	7,680	1,700	10,120	5,580	8,200
Basswood	720	0	440	0	2,220	2,040	1,040	100	220	0	0	0	0
Yellow-poplar	0	0	0	0	0	0	0	0	0	0	0	0	0
Black walnut	0	0	0	0	0	0	0	0	0	0	0	0	0
Black cherry	280	0	760	0	280	440	360	100	0	760	220	0	0
Butternut	0	0	0	0	0	0	0	0	0	0	0	0	0
Elm	220	0	180	520	280	440	80	280	0	720	380	0	0
Paper birch	34,100	12,480	16,400	22,820	24,540	33,940	44,340	39,440	36,860	40,560	37,020	52,280	46,080
Other hardwoods	20	0	0	0	60	0	0	120	0	0	0	0	0
Noncommercial species	560	20	80	460	380	460	620	0	620	920	6,360	0	0
Total	60,580	18,740	26,660	34,960	48,780	68,380	76,320	64,980	67,520	86,860	73,460	91,680	83,140
All species	75,620	24,880	33,080	49,200	69,460	81,880	91,660	78,880	89,780	115,000	96,360	111,580	106,440
Number of plots	190	15	18	6	13	23	45	36	15	6	7	2	4
Standard error	2,800	5,320	5,780	9,160	7,720	6,540	4,740	6,080	10,180	9,920	10,800	11,660	9,080
Average basal area	94	38	47	75	89	103	113	98	108	124	112	116	117

[1/] Forest type definitions and species list are in the appendix.

[2/] Weighted average over all stand-age classes--the average biomass per acre for all ages in the forest type and index range.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1984—767-169/10069

Hahn, Jerold T; Stelman, Joan M.
Empirical yield tables for Michigan. Gen. Tech. Rep. NC-96. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1984. 33 p.

Describes the tables derived from the 1980 Forest Survey of Michigan and presents ways the tables can be used. These tables are broken down according to Michigan's four Forest Survey Units, 14 forest types, and 5 site-index classes.

KEY WORDS: Inventory, volume, growth.

0001 UCC001 RETURN TO BC R69 83/01/25
UCC001 AHGIERW WXL6018

NCR DATA CENTERS

MICROFICHE SYSTEMS

Twin Cities District
2523 Wayzata Boulevard
Minneapolis, Minnesota 55405

0001 UCC001 RETURN TO BC R69 83/01/25
UCC001 AHGIFEJ WXL6018

NCR DATA CENTERS

MICROFICHE SYSTEMS

Twin Cities District
2523 Wayzata Boulevard
Minneapolis, Minnesota 55405

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